UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

MARCH, 1886.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

BY H. H. C. DUNWOODY,
1ST LIEUTENANT, 4TH ARTILLERY, U. S. A., A. S. O. AND ASSISTANT.

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1886.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of March, 1886.

Name of vessel.	Captain.
Allan Line.	
Br. s. s. Grecian	Capt. C. E. LeGallais.
Norwegian	R. Carruthers.
Prussian	Alex. McDougal.
Scandinavian	John Park.
Siberian	R. P. Moore.
American Line.	
Br. s. s. British Crown	Geo. Barton.
British Princess	E. H. French
Am. s. s. Indiana	R. W. Sargent.
Br. s. s. Lord Clive	F. Urquhart.
Ocean Prince	W. J. Milburn.
Anchor Line.	
Br. s. s. Acadia	John McKeague.
Alexandria	Robert Fort.
Circassia	A. Campbell.
Columbia	R. Th. Garvie.
Devonia	Hugh Young.
Dorian	Isaac Swain.
Ethiopia	John Wilson.
Italia	Thos. Craig.
Olympia	James Brown.
Trinacria	Geo. Mitchell.
Anglo-Australian Steamship Company.	
Br. s. s. Port Phillip	Geo. Dulling.
Arrow Line.	
Br. s. s. Crystal	R. B. Stannard.
Atlas Line.	
Br. s. s. Allen	J. W. Sanson.
Albano	H. R. Hughes.
Span. Alps	T. Anzsagasti.
Br. Alva	David Williams.
Span. Andes	D. de Amézaga.
Antillas	R. Morán.
Br. Claribel	T. M. McKnight.
Bank's S. S. Co. (Limited).	
Br. s. s. Clonmel	Thomas Burley.
Bordeaux Steam Navigation Company.	
Fr. s. s. Chateau Lafite	C. Journeil.
Bristol City Line.	
Br. s. s. Brooklyn City	W. Flitt.
Jersey City	E. Horbor.
Llandaff City	T. H. Gore.
Wells City	T. L. Weise.
Cromwell Line.	
Am. s. s. Hudson	H. R. Freeman.
Cunard Line.	
Br. s. s. Aurania	W. H. P. Raine.
Caledonia	Alex. McKay.
Gallia	M. Murphy.
Pavonia	R. Woodlenden.
Servia	H. McKay.
Edward Carr's S. S. Line.	
Ger. s. s. Polynesia	A. Kuhn.
Fabre Line.	
Fr. s. s. Alesia	—— Valliat.
Furness Line.	
Br. s. s. Boston City	W. T. Sherborne.
Durham City	M. P. Lund.
Stockholm City	K. Doyle.
General Trans-Atlantic Steamship Co.	
Fr. s. s. Amérique	E. Santelli.
St. Germain	—— Boyer
Labrador	F. d'Hauterive.
Normandie	G. de Kersaliec.
St. Laurent	M. de Jonsselin.
Great Western S. S. Line.	
Br. s. s. Dorset	Ch. Off. Wm. H. Bates.
Guion Line.	
Br. s. s. Alaska	Capt. Geo. S. Murray.
Arizona	J. Price, R. N. R.
Nevada	John Douglas.
Wisconsin	Edward Bentley.
Wyoming	C. L. Bigoy.
Hamburg-American Line.	
Ger. s. s. Bohemia	R. Karlowe.
Gellert	W. Kuhlewein
Lessing	B. Voss.
Moravia	O. Pesoldt.
Rhaetia	H. Vogelgesang.
Rugia	A. Albers.
Saxonia	C. Ludwig.
Wieland	C. Hobich.
Westphalia	E. Kopff.
Inman Line.	
Br. s. s. City of Berlin	Francis S. Land
City of Richmond	A. W. Lewis.
Johnson Line.	
Br. s. s. Nessmore	John Inch.
Longport & Neff's Steamship Company.	
Br. s. s. Archimedes	Wm. H. Fairlem.
Biela	Fred Graham.
Hasellie	John Carroll.
Belg. s. s. Hipparchus	Wm. Kelly.
Br. Olbers	James Clarke.
Leyland Line.	
Br. s. s. Istrian	Robert Leech.
Virginian	M. Flitt.
Mallory Line.	
Am. s. s. Alamo	Sam. Rich.
Lampasas	W. B. Crowell
San Marcos	A. C. Burrowe.
Mediterranean & New York Steamship Co.	
Br. s. s. Pontiac	J. H. Martin.
Pyrus	William Bowen.
Mon. & Dominion S. S. Co.	
Br. s. s. Montreal	E. Bouchette.
Ontario	W. P. Cuncs.
Toronto	Jas. McAuley.
Monarch Line.	
Br. s. s. Assyrian Monarch	John Harrison.
Egyptian Monarch	W. S. Morgan.
Grecian Monarch	B. J. W. Bristow.
Morgan's La. & Texas R. R. & S. S. Co.	
Am. s. s. Chalmette	Robt. B. Quick.
Lone Star	Geo. W. Mason.

Name of vessel.	Captain.
National Line.	
Br. s. s. Denmark	Capt. Geo. Cochrane.
Egypt	R. W. Grace.
England	T. P. Hedley.
France	A. D. Hadley.
Greece	A. J. Joffrey.
Hellenic	John Milligan.
Holland	Wm. Tyson.
Italy	James Sumner.
Spain	W. A. Griffiths.
The Queen	James Sumner.
Navigazione Generale Italiana.	
It. s. s. Archimede	Domenico Viola.
Gottardo	G. Dillberto.
Plata	Luigi Cassovich.
New York and Cuba Mail S. S. Co.	
Am. s. s. Cienfuegos	C. M. Faircloth.
N. Y., Havana & Mexican Mail S.S. Co.	
Am. s. s. City of Alexandria	J. W. Reynolds.
North German Lloyd Steamship Co.	
Ger. s. s. America	G. Meyer.
Donau	C. Pohle.
Ems	H. Heimers.
Elbe	H. Richter.
Eider	W. Willigerod.
Fulda	K. Klogk.
Habsburg	F. Pfeiffer.
Hermann	H. Bant.
Main	H. Christoffers.
Rhein	C. Wiegand.
Werra	Richard Bussius.
Weser	H. Bruns.
Occidental and Oriental Steamship Co.	
Br. s. s. Oceanic	John Melvalle.
Ocean Steamship Company.	
Am. s. s. City of Augusta	K. S. Nickerson.
Juniata	S. L. Askins.
Chattahoochee	J. W. Catharine.
Oceanic Steamship Company.	
Am. s. s. Mariposa	H. M. Hayward.
Old Dominion Steamship Company.	
Am. s. s. Manhattan	Frank Stevens.
Oregon Railway and Navigation Co.	
Am. s. s. Columbia	Fred Bolles.
Oregon	E. Palemann.
Pacific Coast Steamship Company.	
Am. s. s. Orizaba	John N. Ingalls.
Santa Rosa	C. B. Johnson.
State of California	G. Debney.
Pacific Mail Steamship Company.	
Am. s. s. Acapulco	W. G. Shackford.
City of New York	Robt. K. Searle.
City of Para	L. Dexter.
City of Peking	G. G. Berry.
City of Rio Janeiro	Wm. B. Cobb.
City of Sydney	H. C. Dearborn.
Colima	J. M. Caverly.
Colon	Chas. C. Lima.
Granada	W. B. Seabury.
San Blas	Thos. Chapman.
San José	A. D. Austin.
Pyman Watson Steamship Company.	
Br. s. s. Netley Abbey	H. N. Vyvyan.
Quebec Steamship Company.	
Br. s. s. Muriel	G. S. Locke.
Trinidad	W. J. Fraser
Red Cross Line.	
Br. s. s. Theresina	I. Hempthorne.
Red "D" Line.	
Am. s. s. Philadelphia	Sam. Hess.
Red Star Line.	
Belg. s. s. Belgenland	W. A. Beynon.
Nederland	Allen J. Griffin.
Noordland	H. E. Nickels.
Pennland	Rud. Weyer.
Rhynland	J. C. Jamison.
Switzerland	H. Buschmann.
Westland	J. Oelsewag.
Westernland	Com. W. G. Randle.
Zeeland	Capt. L. De Smet.
Rotterdam Line.	
Dtch. s. s. P. Caland	T. H. Bonjer.
Schiedam	G. Bakker.
Veendam	H. von der Zee.
Royal West Indian Mail Steamship Company of Amsterdam.	
Dtch. s. s. Oranje Nassau	J. A. J. Lacrooy.
State Line.	
Br. s. s. State of Georgia	G. Moodie.
State of Nebraska	A. G. Brace.
State of Nevada	John A. Stewart.
State of Pennsylvania	Alfred Mann.
Thingvalla Line.	
Den. s. s. Geiser	C. W. Moller.
Hekla	A. G. Thomsen.
Island	W. Skjöldt.
Thingvalla	S. T. H. Laun.
Tyne and Wear Steamship Company.	
Br. s. s. City of Newcastle	W. T. Irving.
U. S. and Brazil Mail S. S. Co.	
Am. s. s. Advance	Jas. R. Beers.
Warren Line.	
Br. s. s. Iowa	Samuel Walters.
Norseman	E. Mackie.
White Cross Line.	
Belg. s. s. De Ruyter	J. J. Brarens.
Hermann	D. Meyer.
Jan Breydel	H. Meyer.
White Star Line.	
Br. s. s. Adriatic	H. Parsell.
Baltic	Geo. Barton.
Britannic	H. Perry.
Germanic	C. W. Kennedy.
Republic	P. J. Irving.

Name of vessel.	Captain.
Wilson Line.	
Br. s. s. Bravo	Capt. Charles Smith.
Bassano	W. Rea.
Buffalo	J. H Malet.
Chicago	J. W. Jones.
Galileo	Richard Potter.
Lepanto	Wm. Abbott.
Rialto	Wm. Rippeth.
Salerno	B. H. Rogers.
Miscellaneous.	
Br. s. s. Abenora	Robt. Temple.
Ger. Brutus	J. A. Voege
Creighill	W. H. Bennett.
Br. Camden	S. B. Chandler.
Cranbrook	John W. Harrop.
Edith Godden	John H. Bennett.
El Calleo	Joseph Scholt.
Span. s. s. Hugo	A. de Mugica.
Br. Joseph Verona	John J. Meheran.
Lord Lansdowne	C. H Baskfil.
Am. Lorenzo D. Baker	Warren F. Wiley.
Span. Navarro	S. de Aldecoeon.
Br. Prydian	Moses Parry.
Br. Rydal Water	J. H. Jones.
Ger. Salaten	J. Viereck.
Br. Stag	James Adams.
Sulina	Thomas Potter.
Span. Valentia	J. A. Estopiñá.
Br. Vortumnus	C. E. Cook.
Viola	L. Murray.
"New York Herald Weather Service."	
Am. s. s. Acapulco	W. G. Shackford.
Br. Adriatic	H. Parsell.
Am Advance	J. R. Beers.
Br. Ailsa	J. W. Sanesm.
Albano	H. R. Hughes.
Alene	E. J. Seiders.
Am. Algiers	J. B. Percy.
Br. Alvo	D. Williams.
Br. Arizona	Sam. Brooks.
Baltic	G. Barton.
Belg. Belgenland	W. A. Beynon.
Br. Britannic	H. Perry.
Am. City of Alexandria	J. W. Reynolds.
Br. City of Chicago	Fred Watkins.
Celtic	Benj. Gleadell.
Am. City of Puebla	John Deaken.
Br. Claribel	T. M. McKnight.
City of Richmond	Arthur Lewis.
Am. Colon	Chas. Lima.
Chalmette	Robt. B. Quick.
Ger. Ems	W. Willigered.
Br. Gallia	M. Murphy.
Dan. Geiser	F. V. Schierbeck.
Ger. Lessing	B. Voss.
Belg. Nederland	A. J. Griffin.
Br. Olympia	James Brown.
Oregon	P. Cottier.
Orinoco	S Garvin.
Dtch. P. Caland	F. H. Bonjer.
Br Persian Monarch	Jas. Watson.
Belg. Pennland	R. Weyer.
Br. Republic	P. J. Irving.
Belg. Rhynland	J. C. Jamison.
Am. San Marcos	Ch. Off. A. B Connor.
Dtch. Schiedam	Capt. G. Bakker.
Br. State of Pennsylvania	A. J. Mann.
State of Nebraska	A. G. Brace.
Belg. Switzerland	H. Buschmann.
Fr. St. Laurent	M. de Jonsselin.
Dtch. W. A. Scholten	G. J. Vis.
Belg. Westernland	Com. W. G. Randle.
Sailing vessels.	
Am. bg. Abbie Clifford	Capt. D. W Storer.
Am. sc. Abbie H. Gheen	W. W. Gheen.
Am. bg. Arco	J. W. Cates.
Nor. sp. Ariel	Fred. Schwings.
Nor. bk. Artemis	E. E. Moe.
Ger. bk. Athena	A. Witte.
Br sp. Charles S. Whitney	Geo. D. Spicer.
Br. bk. Corisande	Daniel Thorne.
Ger bk. Cornelius	H. Windhorst.
Br. sp. City Camp	D. McLeod.
Ger. sp. Dora	H. Myer.
Am. schr. Emily Sheppard	E. Coggins.
Am. sc. Edward R. Emerson	A. H. Child.
Am bg. Ernestine	E. R. Norton.
Br. schr. Etta A. Watt	G. T LeCompte.
Br. bk. Exile	George J. Pearce.
Am. schr. Governor Hall	John Craig, jr.
Nor. bk. Grundloven	O. G. Ellingsen.
Am. bk. Harriet S. Jackson	W. T. Bacon.
Am. schr. John J. Hanson	L. J. Stevens.
Am. bg. John Wesley	John H. Hines.
Am. schr. Joseph Souther	Joseph W. Watts.
Br bk. Kryolith	Wm. C. Stephen.
Ger. bk Leucadia	John Stohff.
Am bg. L. & W. Armstroug	A. Alexander.
Am. bg. L. F. Munson	Jas. A. Smith.
Br. bg. Lilian	H. F. Schive.
Br bkt. Lydia	Geo. Lowery.
Am. schr. Maggie Abbott	D. C. McIntosh.
Am. bg. Mary Fink	D. E. Darrah.
It. bk. Padre	M. Schiaffino.
Dan. bk. Rialto	N. P. Hanson.
Am sp. Rembrandt	J. W. McGilvery.
Am. bk. Sarah Doe	D. S. Merryman.
Am. schr. Sarah D. J Rawson	Thos. D. French.
Br. sp. Servia	Ewd. M. Smith.
Am. bk. Sarah	L. B. Hale.
Br. sp. Sapphire	Geo. W. Murray.
Br. bk. Still Water	F. P. Trites.
Nor. bk. Tros	Severin Brager.
Ger. sp. Union	H. Fokken.
Ger. bk. Western Chief	Fr. Sander.

MONTHLY WEATHER REVIEW.

VOL. XIV. WASHINGTON CITY, MARCH, 1886. No. 3.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during March, 1886, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i. In tracing the centres of the paths of these storms data from the reports of one hundred and eighty-four vessels have been used.

The most noteworthy feature of the month on the north Atlantic was the remarkable continuation of low pressures; barometer readings below 29.0 were reported on thirteen days.

The general deficiency in the mean atmospheric pressure for March forms a noteworthy feature in the meteorology of the month, there being but one station in the United States where an excess over the normal is shown, viz., Red Bluff, California, .02 inch. There are two comparatively small areas where the pressure is normal—one in California and the other in South Carolina. In all other districts the pressure is below the normal; the deficiencies, however, are not marked, and are remarkably even over the entire country; the departures nowhere exceed .08 inch.

On chart i the centres of the paths of fifteen areas of low pressure, traced over the United States, are shown, this number exceeding by three the average for March during the last twelve years. Ten depressions are traced over the Atlantic.

The mean temperature is below the normal on the Pacific coast, in the Rocky Mountain districts, Missouri Valley, and in the Southern States; it is above the normal in the extreme northwest, upper lake region, and in Nova Scotia. The regions of maximum departure from the normal are the middle and southern plateau districts and the extreme northwest, the temperature averaging 3°.1 above the normal in the last-named district, and about 5° below the normal in the plateau districts.

The precipitation is largely in excess of the average in Florida, the east Gulf states, and in eastern Tennessee; quite a marked deficiency occurs in the lower Ohio valley, western Tennessee, and in portions of the central Mississippi valley. In other districts the departures from the normal precipitation are not unusual.

The very heavy rains during the closing days of the month in the Southern States resulted in damaging freshets in that section; the floods had not reached their maximum height at the end of the month.

As in the preceding month, a chart (number v) has been prepared, showing, for selected stations, the oscillations of atmospheric pressure and temperature during the month as noted at the tri-daily telegraphic observations.

The Chief Signal Officer has received from the Rev. J. E. Terberg, voluntary observer, Pekin, Tazewell county, Illinois, a series of interesting charts illustrating the atmospheric pressure, temperature, and other meteorological phenomena for March, 1886, at that place. Of the charts referred to, four are presented in this REVIEW, and will be found on the back of chart v; they exhibit (first) the mean temperature and "sun-heat," (second) the range of temperature, (third) the mean relative humidity, (fourth) the direction and force of the wind. In the plate representing wind data the Arabic numerals refer to dates; the Roman numerals indicate the force (scale not stated) of the wind; and the signs: •, —, +, indicate the hours of observation, viz., 7 a. m., 2 and 9 p. m., respectively.

In the preparation of this REVIEW the following data, received up to April 20, 1886, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and twenty-two Canadian stations, as telegraphed to this office; one hundred and forty-six monthly journals and one hundred and sixty-four monthly means from the former, and twenty-two monthly means from the latter; three hundred and ten monthly registers from voluntary observers; sixty-one monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Illinois, Indiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for March, 1886, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure is greatest over the northern and central Rocky Mountain districts, and, as in the preceding month, it is least over the Canadian Maritime Provinces. Throughout the entire country the barometric means range from 29.73 to 30.15, the highest being reported from Montrose, Colorado, and the lowest from Sydney, Nova Scotia. Along the Pacific coast and in the Southern States, except in southern Texas, the mean pressures slightly exceed 30.0.

As compared with the mean pressure for the preceding month, a decrease is shown throughout the United States, except at Los Angeles and San Diego, California; at the former station no change occurs, and at the latter the mean pressure is .02 higher than for February. Over the greater part of the country the decrease exceeds .10, and over the central and southern Rocky Mountain districts it amounts to .20.

The departures from the normal pressure at the various Sig-

nal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are shown by lines connecting stations of equal departure. The following stations report mean pressures which correspond with the normal for March: Charleston, South Carolina; Los Angeles, Sacramento, San Francisco, California; and Yuma, Arizona. At Red Bluff, California, the mean pressure is .01 above the normal. In all other parts of the country the pressure is below the normal for the month. The departures are remarkably even over the entire country; while they nowhere exceed .08 they are above .04 over the greater part of the country. All the lines on chart iv representing the departures indicate deficiencies of .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also shown in the tables of miscellaneous meteorological data. The monthly ranges are greatest in New England, where they vary from 1.22, at New Haven, Connecticut, to 1.62, at Eastport, Maine; they are least in Arizona and northern California. At stations in the Lake region the monthly ranges vary from 1.16 to 1.44.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
	Inches.		*Inches.*
Eastport, Maine	1.62	Fort Grant, Arizona	0.46
Chicago, Illinois	1.44	Fort Thomas, Arizona	0.48
Milwaukee, Wisconsin	1.44	Fort Apache, Arizona	0.48
Portland, Maine	1.43	Yuma, Arizona	0.49
Grand Haven, Michigan	1.43	San Diego, California	0.53
Escanaba, Michigan	1.41	Los Angeles, California	0.57
Mackinaw City, Michigan	1.39	Key West, Florida	0.57
Alpena, Michigan	1.36	Prescott, Arizona	0.59

AREAS OF HIGH PRESSURE.

Ten areas of high pressure have been traced over the United States or adjoining territory during the month of March, 1886. Five of these areas originated to the west or northwest of the north Pacific coast; four were first observed on the east slope of the Rocky Mountains, north of the fortieth parallel; and one formed on the south Atlantic coast and passed northeast along the coast and disappeared to the northeast of Nova Scotia.

The high areas which originated to the west of the Rocky Mountains generally moved to the southeastward and disappeared before reaching the Mississippi Valley, except number viii, which continued its course to the southeastward and disappeared off the south Atlantic coast.

The direction of movement of those areas which originated on the east slope of the Rocky Mountains was also generally to the southeast or south, and all disappeared within the limits of the field of observation, with the exception of number x, which moved first southeastward, and after reaching the Mississippi Valley the course changed to northeast, following the general direction of the coast until it passed beyond the limits of observation.

Of the ten areas of high pressure observed during the month, seven disappeared within the limits of the field of observation; three passed over the Atlantic, and one, appearing on the north Pacific coast, apparently moved to the southwestward.

I.—This area is a continuation of that previously referred to in the February REVIEW, having appeared over Washington Territory or the north Pacific coast during the last days of the month, and from March 1st to 5th it remained almost stationary northwest of Lake Superior, gradually diminishing in energy. The highest barometer on the 1st was 30.77, at Prince Arthur's Landing, Province of Ontario; during the 5th it moved southward while low area number i passed eastward off the middle Atlantic coast, and on the following morning, the 6th, it was central in western Missouri; during the 6th it moved eastward into Tennessee, and disappeared on the 7th by a gradual decrease in pressure. The progress of this high area was not marked by specially low temperatures, except on the 1st at Canadian stations on the lakes and in the Saint Lawrence Valley, where the temperature ranged from 5° to 17° below zero.

II.—This high area first appeared in northern California; no special feature marked its course as it moved eastward over Utah on the 8th, during which day it probably united with high area number iii, which was at that time advancing eastward over northern Montana.

III.—Was first observed in northern Montana on the morning of the 8th; the highest reading of the barometer in that section was 30.33, at Fort Buford, Dakota, and the lowest temperature, —4°, at Fort Garry, Manitoba; on the morning of the 9th the pressure had increased to 30.41 at Fort Garry, Manitoba, and the temperature had fallen to —18° at Bismarck, Dakota. Snow was reported in Colorado, Missouri, Iowa, Wisconsin, and thence eastward to the lower lake region. During the 9th it passed rapidly southward to Arkansas, attended by quite low temperatures, but with no decided change in pressure near the centre. After reaching Arkansas its course changed to eastward, and the area passed off the south Atlantic coast on the 11th.

IV.—This area was first observed on the north Pacific coast on the 10th; it extended slowly over the plateau regions during the 10th, 11th, and 12th, moving to the southeastward, but the barometer fell rapidly, and it disappeared to the westward of the Rocky Mountains while a storm of considerable energy crossed to the eastward over British Columbia, north of Montana.

V.—This area also appeared on the north Pacific coast, being first observed in that region on the 14th; it moved southward over the coast line to southern California, and thence eastward over Arizona, and was central in northern New Mexico on the morning of the 17th, where it was last observed

VI.—This area of high pressure appeared off the south Atlantic coast on the morning of the 14th to the southwestward of a severe storm which had formed on the middle Atlantic coast, and was central near Cape Hatteras, North Carolina, on the morning of the 15th. The movement of this high area to the northeast can be clearly traced, although the greatest pressures observed were below 30.30. It passed over the continent and was central in the Ohio Valley during the 16th, after which it moved northeastward with increasing pressure, it having been re-enforced by a slight area of high pressure from the lower Missouri valley. The pressure increased to 30.30 on the 17th over New York, and on the 18th it passed over the Saint Lawrence Valley, attended by decreasing pressure, with areas of low pressure to the east and west; it probably disappeared in advance of the storm traced as number x, without passing to the east of the Saint Lawrence Valley. There was no decided fall in temperature observed within the limits of this area of high pressure.

VII.—Was at no time within the limits of the United States, although the reports from the northern stations show that it passed eastward and probably joined the high area previously described as number vi. It was central to the northeast of New England on the 20th, when it disappeared rapidly, owing to the advance of a low area of decided energy in the Lake regions. It first appeared north of Manitoba on the night of the 16th, and the barometer had risen to 30.40 at Fort Garry, Manitoba, by the morning of the 17th.

VIII.—Appeared off the California coast on the 18th, and on the 19th it extended over California, Oregon, and thence eastward to the central Rocky Mountain region. The movement was to the east and south, and areas of low pressure apparently existed to the north of Washington Territory and upper California; it passed directly eastward over the Rocky Mountain districts on the 20th, the pressure having increased from 30.20 to 30.30. During this movement eastward a storm of considerable energy was passing northeastward from the lower Missouri valley; on the morning of the 21st it was central in Wyoming and moved slowly southward, remaining

almost stationary and covering the Rocky Mountain regions until midnight of the 22d, when it moved rapidly to the upper Mississippi valley and thence eastward over the Ohio Valley, attended by generally fair weather. The barometric gradient was rapid both to the northeast and northwest on the 23d. When central in the Ohio Valley, storms of decided energy were passing off the Nova Scotia coast and approaching from the extreme northwest, while a second area of high pressure was advancing from the north Pacific coast. This area disappeared off the south Atlantic coast on the 25th.

IX.—This area appeared on the north Pacific coast on the 23d and extended rapidly eastward, following the storm which on that date was moving eastward north of Dakota and Montana; it extended over all districts west of the Missouri Valley by the 25th, the centre still remaining in Oregon, where the barometer registered 30.49. These conditions continued until the 26th when this area apparently divided, a portion passing to the eastward of the Rocky Mountains, north of the boundary of the United States, and was central north of Dakota, while the second high area remained on the north Pacific coast. The succeeding reports of the 26th showed that these areas united on the 27th and extended over the northern portion of the continent from the Saint Lawrence Valley to the Pacific coast, its centre being over Manitoba, where the pressure had increased to 30.70; these conditions continued until the 28th, the isobars being almost parallel to the degrees of latitude and the gradient quite rapid in a southerly direction throughout the United States. This condition was followed by the development of a storm in the west Gulf states, the gradual movement of a portion of this high area to the eastward over the Saint Lawrence Valley and the Maritime Provinces, and the formation of a second high area on the eastern slope of the Rocky Mountains.

X.—The midnight chart of the 28th indicated that the storm which was at that time forming in the Gulf of Mexico would advance northeastward, causing a division in the high area previously described by the advance of the barometric trough to the northeastward over the Lake region. On the afternoon of the 29th this area was clearly defined as central over the Missouri Valley, bounded by the isobar of 30.20; these conditions continued until the morning of the 30th, when this area had moved westward to the central Rocky Mountain region, the pressure remaining near 30.30. It extended northward during the 31st, covering the northern Rocky Mountain slope, and at midnight it was central north of Montana, the move ment being apparently to the northeastward. Areas of high pressure extended southward to New Mexico, while a severe storm prevailed in the Lake region and generally throughout the Southern States. The west quadrant of the high area previously described could still be traced along the Nova Scotia coast, and reports from the Pacific coast announced the advance of a depression from the northern section of that region.

AREAS OF LOW PRESSURE.

Fifteen areas of low pressure have been traced on the tri-daily weather charts of the Signal Service during the month of March, 1886. Nine of these areas originated in the Rocky Mountain regions or on the Pacific coast, and nine passed as far east as the Atlantic coast. The general direction of movement was slightly to the south of east while the low areas were west of the ninetieth meridian, and it was slightly to the north of east after passing to the east of this meridian. Four areas of low pressure passed eastward north of the United States; four first became clearly defined as storm-centres on the eastern or middle slope of the Rocky Mountains, and two developed in the lower Rio Grande valley.

I.—This storm originated during the latter portion of February on the north Pacific coast, and on chart i in the WEATHER REVIEW for that month it was traced as far westward as W. 110°, the centre being north of Montana on the 23d. It moved to the eastward north of the Lake region and over the New England coast, causing severe gales, and on the 1st of March these gales continued along the Atlantic coast as far south as Hatteras, North Carolina, the centre of the storm being near N. 45°, W. 50°, where it remained from the 1st to the 5th, the barometer being below 29.00, and northwesterly gales continuing in the Maritime Provinces and on the Atlantic coast with unusual violence. After the 5th the barometer rose slowly at the northeastern stations, but the pressure did not reach normal in these sections until the 9th and 10th of the month.

The following notes from Signal Service observers are of interest:

New London, Connecticut: the series of gales which followed each other in rapid succession between February 25th and March 3d have no parallel in the records of this station for duration and severity. The timely warning was of great benefit.

Block Island, Rhode Island: high winds occurred at this station during the first three days of the month. The maximum velocity being forty-four miles on the 1st.

New York City: a severe northwest gale occurred on the 1st and continued until 10.13 p. m. of the 3d, the wind reaching a maximum velocity of fifty-four miles per hour on the 2d. Several accidents were reported in the city and harbor from the high wind.

Baltimore, Maryland: a severe gale occurred on Chesapeake Bay on the 2–3d, and but few vessels left port. The steamer "Richard Willing" was damaged by the gale to the extent of $2,000, and several schooners were reported ashore.

II.—On the first day of the month the barometer was below the normal on the California coast, in Arizona, and the Rio Grande Valley, and there were indications of an approaching storm from the southwest of Texas. The barometer continued low in this section, and at midnight of the 2d this storm was located as central near N. 25°, W. 101°; the centre could only be approximately located during the 2d and 3d, but the movement was directly to the east, attended by very heavy rains and severe easterly gales in the west Gulf states. Reports from the Gulf coast indicate that it moved directly east over the Gulf of Mexico during the 4th and 5th, causing very heavy rains on the east Gulf coast and in Florida, but the coast stations show no unusual wind-velocities attending this storm. After passing to the east of Florida it moved northward and probably united with the depression traced as number iii, after which the movement was to the eastward of the North Carolina coast.

III.—This low area is traced to the westward on chart i as far as W. 105°, being located as central in Colorado at midnight of the 3d. Reports received from the Rocky Mountain regions and the Pacific coast on the 2d indicate that this disturbance probably originated to the west of the Rocky Mountains. It moved eastward over Kansas during the 4th attended by light snows in the northern quadrant and light rains in the southern quadrant, the depression being slight and the barometer apparently rising at the centre. There was a slight movement to the northeast before reaching the Mississippi Valley, but the direction changed to southeast during the 5th and the depression became more extended as it passed over the Southern States. The morning report of the 6th showed a well-defined depression central near Wilmington, North Carolina, which probably resulted in the uniting of storms traced as numbers ii and iii. This storm was attended by high winds when first observed in the central Rocky Mountain region, but it lost energy as it moved eastward and caused only light showers over the Ohio Valley and northern portion of the Southern States.

IV.—This area was first observed far to the north of Montana on the afternoon of the 6th, when an extended high area covered the central valleys; it moved to the southeastward north of Minnesota, and by midnight of the 7th it was central near Escanaba, Michigan, where the barometer was below 29.70; at this report, the main area extended southward to the Gulf States and west over the Missouri Valley, the gradient being most rapid to the westward. The precipitation attending this storm in the Lake region and Northwest was light and in the form of snow north of the thirty-fifth parallel; it was followed by a cold wave on the 8th and 9th, which was most severe in the Mississippi and Missouri valleys. It moved over

the lower lake region and the New England coast, continuing its southeast direction until passing the Atlantic coast line when it apparently inclined to the eastward; light snows were reported in New England, New York, and the lower lake region previous to and after the centre had passed over these districts. The barometric readings at the centre of this disturbance varied but slightly from 29.70 during the time that it remained within the limits of the stations of observation, but it probably attained its maximum energy while central over Lake Superior. It was last observed as central near Boston, Massachusetts, on the morning of the 9th.

V.—This storm developed rapidly in northern Texas, where it was central on the morning of the 8th, when the storm described as number iv extended over the Lake region and a high area of considerable energy was moving southward from northern Dakota. These conditions continued until the morning of the 9th, the lake storm moving southeastward, the high area and cold wave moving southward, and low area number v moving eastward over the west Gulf states. The easterly movement continued during the 9th, attended by general rains in the Southern States, and after reaching the south Atlantic coast it apparently moved northeastward, and was last observed as central near Hatteras, North Carolina, on the afternoon of the 10th, at which report northerly gales were reported from the coast.

VI.—This area of low pressure was at no time central within the limits of the stations of observation and probably originated in the north Pacific; it was first observed on the afternoon of the 9th in N. 53°, W. 113°, and was last observed north of Quebec, Province of Quebec, at midnight of the 12th. The location of the centre is only approximately given, but the tri-daily reports serve to show the easterly movement. At midnight of the 11th it was central north of Lake Superior, and the trough of low pressure extended southward over Missouri, and in the southern portion of which the storm traced as number vii was central.

VII.—This storm developed over the central plateau region during the night of the 9th, immediately to the west of high areas which covered the central valleys and to the east of the high area which was at that time central off the north and middle Pacific coast, and to the south of the depression, previously described, which at that time was moving eastward north of Montana. The general direction of movement was to the eastward over Colorado and Kansas, inclining slightly to the southward until the centre reached eastern Kansas, when the direction changed to northeast. By the morning of the 10th the high area to the eastward extended over the Atlantic coast, and the high area to the westward had advanced over the northern Rocky Mountain region, but remained central on the north Pacific coast while this depression was central in western Kansas. It moved to the northeastward during the 12th, causing general rains in all districts during the 11th and 12th. The barometer continued to fall at the centre as it passed over the Lake region and the upper Saint Lawrence valley, the minimum pressure, 29.29, being observed at Montreal, Province of Quebec, at midnight of the 12th. A slight "norther" occurred in Texas while this storm was central in the Lake region, and high westerly winds prevailed on the middle Atlantic and New England coasts when it was moving over the Saint Lawrence Valley.

VIII.—This was a secondary depression which developed in the west quadrant of the storm previously described when it was passing over the upper lake region; it was first observed as central in western Minnesota on the morning of the 12th, and it moved southeastward as a slight depression during the succeeding twenty-four hours; it was last observed as a separate depression in northern Michigan on the afternoon of the 13th, although it probably united with a storm which was at that time moving along the Atlantic coast, but it is not so indicated on chart i.

IX.—The tri-daily reports received during the 12th indicated the presence of a disturbance off the south Atlantic coast, the barometer being unusually low over all districts east of the Mississippi. On the morning of the 13th this storm was apparently central on the middle Atlantic coast, and it moved rapidly northward over the New England coast during the succeeding sixteen hours, being central on the New England coast at midnight of that date. It was attended by severe gales on the New Jersey and New England coasts during the 13th and 14th and passed over the northeastern Canadian stations as a severe but rapidly moving storm and disappeared to the northeastward by midnight of the 14th.

X.—This storm developed in the upper Missouri valley during the 13th and moved southeastward to the lower Missouri valley. When first observed the depression was oval shaped, with the longer axis extending north and south, but after reaching the lower Mississippi valley the longer axis had changed direction and extended to the northeastward; the inclosing isobar of 29.70 extending from central Illinois to northern Texas, and the average width of the inclosed area being about one hundred miles. On the morning of the 15th the storm was moving to the northeastward over Illinois, and the oval shape of the depression extended in an east and west direction. It passed over the lower lake region on the 15th and was central in New England on the morning of the 16th. Light rains occurred throughout the northern districts, and high winds were reported from the middle Atlantic and New England coast stations after the centre had passed to the east of the coast line; it passed to the eastward south of Nova Scotia, and was last observed at midnight of the 16th central south of Halifax. During the night of the 15th high winds occurred at Eastport, Maine, and New York City, the maximum velocity in each case being thirty-six miles per hour, while that reported at Sandy Hook, New Jersey, was forty-four miles per hour.

XI.—This disturbance probably originated on the north Pacific coast and it has been traced to the westward of the one hundredth and twelfth meridian, its centre being approximately located north of western Montana at midnight of the 14th. It was at no time within the limits of the stations of observation, and did not reach the Atlantic coast, but after passing directly to the eastward as far as the eighty-fifth meridian, it apparently moved to the northeast and cannot be traced after the afternoon report of the 16th.

XII.—This area of low pressure also originated to the west of the Rocky Mountains. The tri-daily reports received on the morning and afternoon of the 16th indicated that it was central in western Montana at the 3 p. m. report of that date. It first became clearly defined at the midnight report of the 16th central in western Kansas; the depression was slight, however, the lowest isobar being 29.80. It moved eastward over Iowa and northern Illinois during the 17th, attended by light showers and causing no unusual disturbance, and disappeared by a gradual increase of pressure before reaching the Lake region.

XIII.—This storm has been traced from the California coast eastward to the Maritime Provinces, its centre being located at each of the tri-daily reports occurring between the afternoon of the 17th and the morning of the 23d. It apparently approached the coast from the northwest, moving in a southeasterly direction. At midnight of the 17th it was central southwest of San Francisco, California, and general rains prevailed in California, being unusually heavy in the southern portion of the state; it passed eastward over the central plateau region, Colorado, and Kansas during the 17th and 18th, causing light snows and rains at the central and southern Rocky Mountain stations. After passing to the eastward of the Rocky Mountains it increased in energy and the barometer fell at the centre. The easterly movement was rapid until the centre reached the Mississippi Valley, when the course changed to northeast and the movement was retarded. It moved slowly northeastward over the upper lake region, causing severe gales and general snows north of the Ohio Valley; it was followed by a high area from the Rocky Mountain region which increased the gradient in the west quadrant,

causing a "norther" on the Texas coast. After the storm-centre had passed and the wind had shifted to the northwest, the weather cleared rapidly, except in the lower lake region, where light snows continued until the 23d. After the centre reached the vicinity of Saugeen, Province of Ontario, its course changed to eastward, and the succeeding report (that of the morning of the 27th) placed the centre on the coast of Maine, near Eastport. The lowest reading of the barometer, 28.99, occurred at Anticosti, Province of Quebec, when this storm was central in that vicinity on the afternoon of the 23d. Severe gales occurred on the middle, south Atlantic, and New England coasts when this storm was central near Saugeen, and they continued from the northwest on the Atlantic coast after the storm had passed to the northeast of the Canadian stations on the 23d and 24th.

As this storm approached from the central Rocky Mountain region, indications of the probable occurrence of severe local storms were issued from the central office, and the following report from the observer at Cairo, Illinois, relative thereto, is given:

Special telegram announcing severe local storm for this district was received at 12.30 p. m. of the 20th, and was immediately posted in all bulletin frames, railroad companies, etc., notified, and the information telegraphed along the lines of the railroads running out of the city. Steamboats were tied up, railroad companies had their locomotives and cars moved to places of safety, river-men made their wharf-boats and barges secure, transfer boats were tied up and abandoned their trips, gardeners who had plants set out had a force of men employed to cover them with earth if the temperature should fall below the freezing point. Fresh southerly to high westerly winds occurred on the 20th, the maximum hourly velocity being forty-four miles per hour from the west at 9.35 p. m. All telegraph wires were in trouble, being mostly blown down, and but one wire could be worked between this city and Saint Louis, Missouri. Captain Taylor, of the "Gus Fowler," states that the rain fell in torrents at Metropolis, thirty-seven miles north of this city. It is estimated by the railroad companies and merchants that thousands of dollars worth of property were saved by the timely warning.

XIV.—This area of low pressure was observed far to the north of Montana on the 22d, and it passed eastward, inclining slightly southward until the centre had passed the Lake region, after which it followed the course of the Saint Lawrence Valley and disappeared to the east of the Atlantic coast after the 26th; it was no time central within the limits of the stations of observation. The area of high pressure which followed immediately to the west caused the barometer to rise rapidly in the Lake region, and brisk to high winds generally occurred at the lake ports, but the weather remained fair, with the exception of light local showers in the Ohio and central Mississippi valleys.

XV.—This disturbance developed south of Texas on the 28th, during which date the rain-area attending this storm had already extended over the Southern States. The barometer was high to the northeast of New England and north of Dakota, and as this storm developed and moved northward to the Ohio Valley it apparently separated the area of high pressure into two distinct areas, one remaining northeast and the second moving southward over the Missouri Valley. The low area moved slowly northward, causing very heavy rains in the Southern States, especially in Alabama, Georgia, and Tennessee. On the morning of the 30th it apparently divided into two separate low areas, one central near Louisville, Kentucky, and the other central near Mobile, Alabama, and heavy rains continued in the Southern States. These two depressions moved slowly northeastward during the succeeding eight hours, and had united over central Kentucky at the midnight report of the 30th. The northerly movement continued during the 31st over the Lake region, the centre passing over Lake Huron. Severe local storms occurred in all districts east of the Mississippi Valley during the 30th and 31st, and the destructive freshets which occurred in the southern rivers were due to the rains attending this depression.

The following notes relative to this storm are taken from reports of Signal Service observers:

Cairo, Illinois: Captains of river steamers state that the high winds and fine snow that occurred during the night of the 30th–31st made it one of the roughest nights ever experienced on the river.

Chattanooga, Tennessee: a heavy rain fell throughout the 31st, the total precipitation, 5.95 inches, being the greatest amount that has fallen in the same time since the establishment of this station in 1879. Brisk to high westerly winds occurred on the 31st, with flurries of snow.

Knoxville, Tennessee: the total rainfall for the thirty-nine and a half hours ending at 8.38 a. m. of the 31st, 6.56 inches, is the heaviest single rainfall on record since the unprecedented rainfall (8.10) of February 24–26th, 1875.

Milwaukee, Wisconsin: a brisk northerly gale occurred on the 31st, accompanied by frequent changes of rain, sleet, and snow at intervals during the day.

Rochester, New York: a severe westerly gale occurred on the 31st, attended by cloudy and rainy weather.

Smithville, North Carolina: a southerly gale began at 9.50 a. m. of the 30th and reached its maximum velocity, forty-two miles per hour, at 7.45 a. m. of the 31st. Considerable damage was done to the fruit blossoms in this vicinity, and the damage throughout the county is estimated at $5,000. Much praise was bestowed on the Signal Service for the timely warning of the gale, during the prevalence of which five steamers and eleven sailing vessels remained in harbor.

Fort Macon, North Carolina: a heavy southeast gale occurred on the 31st, producing heavy seas; the wind reached a maximum velocity of forty-two miles per hour.

Atlanta, Georgia: the heavy rains that occurred during the last few days of the month ended during the night of the 31st, and the damage by the resulting floods has never before been equalled in this part of the country. The rain was succeeded by high winds which reached a maximum velocity of thirty miles per hour on the 31st.

Savannah, Georgia: a heavy thunder-storm occurred during the early morning of the 31st, accompanied by high winds. Severe storms and floods were reported throughout the state, and great damage was done to crops.

Jacksonville, Florida: a severe gale and thunder-storm occurred on the 31st, the wind reaching a maximum velocity of thirty-four miles per hour from the west. No damage was reported.

Cedar Keys, Florida: a severe thunder-storm passed over this station on the 31st, moving from west to east, accompanied by intense lightning, heavy rain, and a decided fall in temperature, the wind reaching a maximum velocity of thirty-two miles per hour.

The following table gives the latitude and longitude in which the centre of each area was first and last observed, and the average hourly velocity:

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	.....	.....	48 00	57 00	.....
II	25 00	101 00	33 00	76 00	25.0
III	39 00	105 00	33 00	76 00	27.0
IV	53 00	105 00	42 00	67 00	30.0
V	34 00	102 00	33 00	74 00	34.0
VI	53 00	113 00	50 00	72 00	31.0
VII	41 00	109 00	48 00	62 00	40.0
VIII	47 00	96 00	44 00	85 00	20.0
IX	38 00	75 00	46 00	59 00	34.0
X	47 00	105 00	42 00	63 00	32.0
XI	54 00	114 00	52 00	83 00	35.0
XII	47 00	113 00	43 00	89 00	44.0
XIII	38 00	124 00	50 00	62 00	28.0
XIV	54 00	109 00	50 00	63 00	26.0
XV	28 00	95 00	47 00	80 00	29.0

NORTH ATLANTIC STORMS DURING MARCH, 1886.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data, received at this office up to April 20, 1886.

Of the ten depressions traced during the month, five, viz., numbers 1, 4, 6, 7, and 9, are continuations of storms which entered the Atlantic from the North American continent; number 2 is a continuation of an area of low pressure which was central in the ocean near W. 25°, N. 50°, at the close of February; numbers 3 and 10 originated in the mid-Atlantic; and numbers 5 and 8 appeared in the vicinity of the Bermudas. The general direction of movement of these storms was northeasterly and easterly, with exception of number 8, which is

traced from its appearance in N. 35°, W. 70°, northward to N. 40°.

Many of these storms were accompanied by extremely low pressures, barometer readings below 29.00 (736.6) being reported on thirteen days of the month. Vessels over the ocean experienced a continuation of gales and squalls accompanied by high seas up to the 25th of the month, after which the long continued area of low pressure was replaced by an advancing area of high pressure south of the fortieth parallel.

The following abstract of the log of the s. s. "Karo," E. Smith, commanding, exhibits the stormy, rough, and unsettled character of the weather prevailing during the larger part of the month: "Left Gibraltar February 25th and had fair weather, with squalls and light rains at times, until March 3d, in N. 36° 50′, W. 27° 7′, when strong gales began from wsw., increasing to a whole gale, with rain, at midnight. 4th, whole gale wsw., with very high seas, veered to w. and moderated at night; N. 40° 00′, W. 30° 00′ at noon. 5th, in N. 37° 23′, W. 33° 15′, at noon, fresh to strong breeze from sw., increasing at midnight to a whole gale. 6th, in N. 37° 56′, W. 36° 18′, whole gale from the w., moderating to strong gale, with very high seas. 7th, in N. 38° 14′, W. 39° 22′, at noon, strong gale increasing to whole gale, veered to wnw. on the 8th, in N. 38° 45′, W. 42° 2′, and continued all day; lowest barometer was 29.34 (745.2), at 4 p. m. 9th, strong gale from n., moderated in the afternoon. 10th, in N. 39° 36′, W. 48° 1′, strong gale from sw. veered to wsw. and n., then to ese. and moderated. 11th, in N. 40° 6′, W. 51° 50′, fresh se. wind backed to nw. and blew a gale with hurricane force; shipped great quantities of water. 12th, in N. 40° 19′, W. 54° 3′, whole gale from ne., with tremendous seas, and barometer falling until 4 p. m., when it had reached 29.04 (737.6); gale backed to nw. and continued with fury all day. 13th, in N. 40° 30′, W. 57° 4′, strong gale wsw., increasing to whole gale and backed to sw. on the 14th, in N. 40° 32′, W. 57° 32′, and continued all day with very high seas, barometer 29.14 (740.1) at midnight. 15th, strong gale veered to ne. and then backed to nw. and moderated in the afternoon. 17th, in N. 42° 2′, W. 64° 20′ (noon) whole gale began at 7 a. m.; very high seas from nw., backed to ne. at 8 a. m., and thick snow at noon, lowest barometer was 29.54 (750.3) at noon.

The very severe weather off the Atlantic coast of the United States from the 21st to the 25th is exhibited by the log of the s. s. "Ugglan," J. B. Godd, commanding: "March 21, in N. 33° 30′, W. 70° 28′, strong gale began from w. at 4 p. m., varying from w. to sw., and continued with very rough and high seas until 8 a. m. of the 22d, then moderated; but at 11 p. m. strong gale set in again from w., veered to nw. on 23d, with increasing force, and continued until noon of the 24th, when it blew with hurricane force from nw. by n., in N. 36° 41′, W. 69° 27′, and was attended by squalls of snow and hail."

The low pressures which prevailed over the ocean were pushed westward on the 11th by an area of high pressure from the European continent, which extended to the meridian of W. 20° and continued until the 14th. An area of high pressure entered the ocean from the coast of the United States on the 14th, and on the 15th had advanced eastward to the sixtieth meridian, after which date the pressure again fell and on the 17th was below 30.00 (762.0) over the whole north Atlantic, except on the borders of the United States. With these two exceptions the pressure over the ocean remained for the most part continuously low until the 25th, when the pressure south of the fortieth parallel had risen above 30.00 (762.0). This area of rising pressure extended northward on the following days, and at the close of the month prevailed over the whole ocean.

The following are brief descriptions of the depressions charted:

1.—This was a continuation of low area number viii described in the February REVIEW. On February 28th it passed into the ocean south of Newfoundland, and on the 1st of March at 7 a. m. its centre was apparently as far east as the forty-ninth meridian, vessels to the southeast of this position having southwesterly gales and pressures varying between 28.83 (732.3) and 29.00 (736.6). Its influence on this date extended eastward to the thirty-fifth meridian, as is indicated by the following report by Captain W. Pearce of the s. s. "Egypt": "In N. 47° 55′, W. 35° 50′, at 4.50 a. m. the wind set in from wsw. with hurricane force, and backed to se., moderating at 4.55 a. m., with pressure at 29.32 (744.7). This peculiar disturbance of the atmosphere was attended by very vivid lightning and very thick clouds." On the 2d the centre of the storm backed to the westward, and remained without making further progress until March 6th. During this period vessels southward to the thirtieth parallel experienced violent northwesterly gales, and over the ocean east of the fortieth meridian strong easterly winds prevailed.

The following reports exhibit the severity of the storm:

Capt. A. G. Braes, of the s. s. "State of Nebraska," reports a whole gale, force 10 to 11, in N. 42° 10′, W. 58° 20′, at 6 p. m., March 2d, with pressure down to 28.72 (729.5), weather unsettled, with confused sea swell; at 7 p. m. wind shifted to north and blew very hard for about six hours, with thick sleet and snow; mast-heads, yard-arms, and stays covered with St. Elmo's lights. The s. s. "Blagdon," Thos. Dunn, commanding, in N. 51° 36′, W. 43° 30′, on March 2d, had barometer 29.00 (736.6) and wind from the nw. a whole gale, accompanied by terrific squalls and very heavy seas. S. S. "City of Berlin," F. S. Land, commanding, in N. 42° 10′, W. 57° 40′, had barometer 28.80 (731.5) at 1 a. m. on the 3d, with wind blowing a strong gale from the ne. and veering through the s. to the nw. during the day. The ship "Rembrant," J. W. McGilbery, commanding, in N. 36°, W. 70°, on the 3d, experienced a nw. gale of hurricane violence, with furious squalls and gusts and rough seas. Capt. Geo. S. Locke, of the s. s. "Muriel," reports: "At 2 a. m. on the 2d, in N. 34°, W. 69°, wind hauled from nnw. to nw., blowing with great violence and increasing until noon, when it blew a hurricane with very high sea; ship kept before it at full speed; at 4 p. m. again blowing with terrific violence, with occasional squalls which had hurricane force, accompanied by hail and rain." The s. s. "Werra," R. Bussius, commanding, in N. 43° 15′, W. 51° 45′, on the 3d, had barometer ranging from 28.70 (729.0) to 28.80 (731.5), but no strong winds nor heavy swell. A telegram from Bermuda, dated the 5th, reports: "A fearful gale, just moderated, has been blowing with all the violence of a hurricane for eight days without intermission."

At 7 a. m. (75th meridian time) of the 6th the storm-centre, which from the 1st to the 5th made no eastward progress, had advanced northeastward to the forty-fifth meridian; from that date it maintained a steady progress to the northeast, and after the 9th passed beyond the field of observation to the northward.

The following reports of the 8th indicate no abatement, but rather an increase in the intensity of the storm, pressures ranging from 28.30 (718.8) to 28.40 (721.3) being observed with reliable barometers:

The s. s. "Zeeland," L. de Smet, commanding, in N. 50°, W. 28° 30′, had pressure 28.36 (720.3), at 4 p. m., Greenwich time, accompanied by violent southerly gale of force 10 and very heavy seas. Capt. John Harrison, of the s. s. "Assyrian Monarch," in N. 48° 13′, W. 28° 50′, reports: "Barometer 28.30 (718.8) at 11 a. m, with southerly wind of force 11, veering to w.; storm came on very rapidly, with a tremendous cross sea which was running in all directions when the barometer was at its lowest; had to keep ship before the wind until it veered into wsw., then hove to, using oil to great advantage." The s. s. "Pollux," M. Mullinkroot, commanding, in N. 49° 13′ W., 27° 50′, had pressure 28.60 (726.4), at 1 p. m., with wind of force 11, setting in from the se. and veering to sw. The s. s. "De Ruyter," I. I. Brarens, commanding, in N. 46° 52′, W. 32° 22′, had pressure 28.60 (726.4), at 9 a. m., Greenwich time, with wind blowing a whole gale, very heavy squalls and increasing seas. The s. s. "Island," W. Skjödt, commanding, reports: "Very heavy cross sea, in N. 50° 40′, W. 35° 36′, at 9.38

a. m., barometer fell to 28.29 (718.5) at 6.11 p. m., when the wind suddenly veered to west, blowing with hurricane force, accompanied by tremendous high sea."

Capt. R. P. Moore, of the s. s. "Siberian," reports as follows: "March 8, encountered a very severe gale commencing in the se. and veering to sw., increasing in violence; at sw. the wind fell away to nearly a calm, with heavy rain, and suddenly chopped into nw. and blew with hurricane force for ten hours; barometer 28.37 (720.6) at 2 p. m., in N. 50° 52′, W. 31° 00′; experienced a continuation of very heavy gales from the 8th to the 15th (W. 31° to W. 60°.) In all cases the gale set in from se. and veered to sw., increasing in force and blowing steady from sw. for from four to six hours; then chopping into the nw. and blowing very hard, accompanied by terrific squalls and hail."

2.—This was a continuation of the ocean storm number 11, described in the February REVIEW. Rains, and pressures ranging between 29.50 (749.3) and 29.65 (753.1) indicated its centre near N. 49°, W. 9° on the 1st, with a movement to the eastward, and on the second it is charted on the coast of France.

3.—This storm appeared on the 3d in N. 45°, W. 30°, where the pressure had fallen to 29.08 (738.6), with increasing pressures to the northward and westward and high gales to the southward. The gale experienced on this date by the s. s. "Karo," in N. 36° 50′, W. 27° 7′, was apparently due to this depression. On the 4th the centre had moved northeastward to N. 49°, W. 20°, vessels to the eastward having southeasterly winds, and on the 5th the storm-centre is charted off the northwest coast of France, where pressures of 29.07 (738.4) and 29.11 (739.4) were reported by vessels in N. 50°.

4.—This was a continuation of low area number iv described under "Areas of low pressure" in this REVIEW. On the morning of the 9th it passed into the ocean north of N. 40° and then moved rapidly eastward. At 11.30 p. m. the s. s. "Thornholm," W. Holmes, commanding, in N. 40°, W. 54° 51′, had pressure 29.55 (750.6) and wind blowing a whole gale. On the 10th the centre is charted near W. 51°, where the pressure had fallen from 29.75 (755.6) on the 9th to 29.50 (749.3), and a nw. gale, of force 11, was reported by the ship "City Camp," in N. 40° 46′, W. 53° 20′, at 8.27 a. m. From this position the storm moved northeastward with decreasing pressure at the centre.

The following reports exhibit the character of the accompanying weather:

The s. s. "Assyrian Monarch," in N. 46° 50′, W. 37°, had pressure 29.30 (744.2) at midnight of the 10th, with wind blowing a whole gale from sw. to nw. during the preceding twelve hours, accompanied by vivid lightning to the sw., and leaving a very heavy cross sea. The s. s. "De Ruyter" reports: "Wind began to blow at 10 p. m. with hurricane force from the ssw., lightning in the west, with heavy rain; at 2 a. m., Greenwich time, of the 11th, while in N. 44° 56′, W. 37° 50′, blowing with hurricane force from the west, accompanied by thunder and lightning, with heavy rain, and barometer reading 29.64 (752.8). St. Elmo's light was seen on the yards." On the 11th the progress of the depression was checked by an area of high pressure over Europe which extended westward to the meridian of W. 20°; on the 12th the centre is charted in N. 49°, W. 37°, where the pressures ranged between 29.18 (741.2) and 29.25 (742.9), showing a decided fall in pressure to the west of the position of the centre on the 11th. Gales of storm-force prevailed south of the track of the depression, accompanied by heavy rains. During the 12th the storm resumed its eastward course, but with decreasing energy, until off the west coast of Ireland on the 14th the lowest pressure reported was 29.60 (751.8).

5.—This storm appeared on the 10th north of the Bermudas, where vessels reported gales of storm-force and pressures ranging between 29.44 (747.8) and 29.65 (753.1); from this position it moved northeastward, with falling barometer. On the 11th the ship "Charles S. Whitney," in N. 37° 34′, W. 62° 30′, had pressure 29.24 (742.7) and nne. gale, of force 9, with heavy rain and lightning, the yard-arms being covered with balls of fire. The storm continued northeastward with uniform velocity until the 13th, after which date its further course cannot be traced (owing to the absence of reports) eastward of its position near the thirty-ninth meridian on that date.

6.—This was a continuation of low area number ix, described in this REVIEW. Its influence began to be felt on the ocean on the 13th, when vessels off the coast of the United States had pressure about 29.50 (749.3), and sw. gales, of force 9, were reported off Hatteras eastward to the sixty-seventh meridian. On passing into the ocean on the 14th the low area increased in energy; pressures below 29.00 (736.6) were reported by vessels south of the Banks, and high southerly and westerly gales prevailed from the coast eastward to the forty-ninth meridian.

The following reports are selected as illustrating the severity of the storm:

The s. s. "Siberian," Capt. R. P. Moore, commanding, experienced a gale setting in from the sw. on the 13th, with barometer falling to 28.97 (735.8) at 12 noon of the 14th, in N. 42° 46′, W. 57° 12′; the wind then increased to storm-force, veering to w. and nw., and was accompanied by terrific squalls, mountainous seas, and heavy rain and hail squalls. The s. s. "Zeeland," at 5 a. m. of the 14th, had strong s. by w. gale, very high sea and rain squalls; from 3 to 7 p. m. gale increased to force 10, and barometer fell to 29.02 (737.1), in N. 42° 57′, W. 55° 30′, accompanied by terrible high and confused seas. The s. s. "Assyrian Monarch" had pressure 28.95 (735.3), at 11.30 a. m. of the 14th, in N. 42° 10′, W. 52° 50′, with westerly gale of storm-force. Similar reports were also made by the s. s. "Arizona" in N. 41° 34′, W. 62° 36′; s. s. "Dorset," N. 41° 40′, W. 61° 30′; s. s. "Assyria," in N. 42° 14′, W. 65° 10′; s. s. "Rhaetia," in N. 44° 10′, W. 51°; s. s. "St. Laurent," barometer 28.81, in N. 43° 27′, W. 54° 52′; s. s. "State of Indiana," in N. 44° 16′, W. 45° 47′; s. s. "Cairo," westerly gale of storm-force in N. 35° 21′, W. 56° 56′; the s. s. "Edam," pressure 28.89, gale of storm-force, in N. 47° 50′, W. 43° 20′, and the s. s. "De Ruyter," in N. 43° 26′, W. 50° 30′. In its progress eastward, the storm lost a portion of its intensity and on the 15th is charted in W. 46°, the lowest pressures reported being between 29.15 (740.4) and 29.25 (742.9). On the 16th the centre is charted in N. 47° W. 38°, where the pressure had fallen to 29.12 (739.6), as reported by the s. s. "Ems," and northerly gales of force 9, prevailed to the westward, with pressure increasing to 30.00 (762.0) at the fiftieth meridian. On the 17th a remarkable development of energy is manifested by pressures ranging from 28.80 (731.5) to 29.00 (736.6) between W. 32° and 44°.

The following are a portion of the special reports received:

The s. s. "Polynesia," A. Kühn, commanding, experienced a gale setting in from the nw. at noon of the 16th, with force 9, and increasing until evening, when it attained a force of 11; the barometer continued to fall until 9 a. m. of the 17th, when it reached 28.80 (731.5), in N. 44° 36′, W. 43° 42′. The s. s. "Servia," H. Mackay, commanding, in N. 47° 36′, W. 38° 00′, had pressure 28.98 (736.1) at 4 p. m. of the 17th, with fresh easterly gale. The s. s. "Caledonian," A. Forshaw, commanding, in N. 35° 36′, W. 23° 21′, had strong gale with terrific squalls on the 17th, with barometer at 29.38 (746.2) at 8 a. m. Equally low pressures continued on the 18th in the same locality, but with decreasing winds. Thus the "Westernland," with pressure 28.69 (728.7), had a gentle breeze. This absence of high gales was due to the prevalence of low pressures over the whole Atlantic, except upon the coast of the United States, and the consequent absence of any steep gradients. The s. s. "Scandinavian," John Park, commanding, in N. 47° 49′, W. 30° 38′, had pressure 28.75 (730.2) at 10 a. m. of the 18th; oil bags were put out to lessen the high, rough sea. After the 19th this storm does not seem to have existed as a distinct depression, but was apparently merged into the advancing depression number 7.

7.—This was a continuation of low area number x described in this REVIEW. This storm entered the ocean between the 7 a. m. observations of the 16th and 17th, and on the latter date was central near N. 40°, W. 60°, where the pressure was about 29.75 (755.6), and northerly gales prevailed in W. 65°. On the 18th the centre is charted in W. 48°, vessels to the ne. reporting ne. winds and pressures 29.00 (736.6). The s. s. "Waesland," T. Ueberweg, commanding, in N. 40° 49′, W. 62° 19′, had high confused sea on the 17th, with thunder and lightning and heavy rain squalls. On the 19th and 20th the pressure over mid-ocean continued below 29.00 (736.6), the winds near the centre of the depression being generally light. The progress made during the 19th was small, and on the morning of the 20th the centre is charted in W. 41°. The course of movement was steadily northeast, and on the 22d the centre had reached W. 25°, where pressures to the southward ranged between 29.15 (740.4) and 29.30 (744.2). After this date it passed northward beyond the field of the present observations.

8.—This was a slight depression central on the morning of the 20th between the Bermudas and Cape Hatteras, where the pressure ranged between 29.50 (749.3) and 29.60 (751.8). Its intensity is exhibited by the report of the bark "Eugenie," J. Foley, commanding: "In N. 34° 55′, W. 75°, strong gale began from ese. to ssw. at 8 p. m., with very high seas; at noon of the 21st, in N. 39°, W. 72° 47′, increased again to strong gale from s., with very heavy squalls." The storm moved northward with falling barometer, and at 7 a. m. of the 21st is charted off the coast, in N. 40°, where the pressure ranged from 29.3 (744.2) to 29.4 (746.7).

9.—This depression is a continuation of low area number xiii described in this REVIEW. It reached the coast of Maine at 7 a. m. of the 22d, and vessels to the southeast reported pressures ranging from 29.23 (742.4) to 29.55 (750.6). On this date vessels south of the Banks had strong se. gales and heavy rain. On the 23d high westerly gales prevailed from the coast eastward to W. 60°, and as far south as the thirtieth parallel.

The following reports exhibit their severity: The bark "Heinrich Bauer," W. P. R. Fretwurst, commanding, in N. 30° 30′, W. 69° 9′, encountered a strong gale setting in from the sw. increasing to storm-force, with rain and very high seas; veering to wnw. on the 24th, in N. 31° 34′, W. 68° 43′, it blew a terrific storm, accompanied by very rough sea. The ship "Prince Lucien," John Clegue, commanding, in N. 31° 13′, W. 68° 00′ reports a fresh gale set in from w., with cloudy weather, on the 24th, increasing to strong wnw. gale at night, with terrific squalls and very high seas.

The centre of the low area passed into the ocean on the 23d and on the 24th is charted in W. 41°, pressures to the southward ranging about 29.30 (744.2). The storm-centre moved northeastward, and at 12 noon, Greenwich time, of the 25th had reached N. 55°, W. 32°, near which the pressure was reported at 29.08 (738.6), generally light winds and fair weather prevailing over the steamer lanes. The storm thereafter apparently continued northward beyond the region of observation.

10.—This storm originated near N. 48°, W. 32°, on the 26th and moved rapidly northeastward to the west coast of Ireland. The following vessels report its passage: the s. s. "Picqua," in N. 40° 57′, W. 24° 16′, on the 26th, encountered a strong nw. gale, increasing to a whole gale, with very high seas and terrific squalls; continued through the 27th, accompanied by thunder and lightning. The s. s. "Virginian," M. Fitt, commanding, in N. 50° 34′, W. 10° 18′, on the 27th, had fresh increasing to strong sw. gale, with rain and sleet. On the 28th the lowest pressures reported were off the north coast of Ireland, and ranged between 29.45 (748.0) and 29.70 (754.4). After this date the centre of the disturbance was probably beyond the limits of the chart, but its influence is apparent in the high westerly gales that prevailed on the 29th and 30th about the fiftieth parallel from the coast as far west as the meridian of W. 40°. Diminished pressures over this region on the 30th indicate the presence of a new depression of increased energy to the northward. High westerly gales, due to this new development, continued through the close of the month as far west as the twenty-fifth meridian.

The following reports describe the character and severity of this disturbance:

The s. s. "Umbrian," Wm. McMickan, commanding, had gale beginning on the 27th from the sw. and continued from the w. and nw. until April 1st, reaching the force of 9 to 11; in N. 50° 30′, W. 23°, the pressure fell to 29.50 (749.3) at midnight March 29th; a high, dangerous cross sea prevailed; position on April 1st, N. 46°, W. 40°. The s. s. "Milanese," John Trinick, commanding, in N. 48° 19′, W. 12°, on the 27th, had fresh gale from wsw., with high sea, increasing to strong gale, veering to nw. at night; barometer 29.71 (754.6) at noon; 28th, in N. 47° 45′, W. 15° 15′, sw. wind increased to strong gale, with heavy rain; veered to nw. in the afternoon, with high seas and heavy squalls at night; moderated at noon on the 29th, in N. 46° 59′, W. 18° 23′, but at 10 p. m. increased to fresh wsw. gale and to strong gale at midnight; 30th, in N. 46° 36′, W. 21° 23′, strong wsw. gale, with high seas, veered at 10 a. m. to nw., with heavy squalls, increased in afternoon to whole gale, with very heavy squalls and high seas; on the 31st gale increased at 7 p. m. to storm-force, with high seas, ship rolling heavily and shipping large quantities of water; 10 p. m. strong lightning and heavy rain; barometer at noon of 31st was 30.26 (768.6). The s. s. "Martello," F. E. Jenkins, commanding, experienced these gales from March 30th to April 1st, blowing from s. to w.; on the 31st, at noon, in N. 49° 45′, W. 8° 20′, pressure fell to 29.44 (747.8); on April 1st wind increased to strong gales, and was attended by very heavy squalls and hail.

The s. s. "Palestine," W. Whiteway, commanding, had moderate gale from w. on the 29th, in N. 51° 13′, W. 13° 06′, with hail and rain, increasing to strong nw. gale at noon; 30th, in N. 51° 11′, W. 16° 32′, strong gale from sw., with heavy squalls of rain and hail, and barometer 29.72 at noon; 31st, in N. 51° 6′, W. 20°, strong w. gale, with heavy rain and hail and high seas, barometer 30.04 (763.0) at noon. The s. s. "Waldensian," D. James, commanding, encountered nw. gale, with hard squalls and high seas, on the 28th, in N. 53°, W. 14° 17′, which continued blowing with force of a fresh to strong gale until April 1st; at 8 p. m. of the 28th barometer fell to 29.61 (752.1); 29th, in N. 52 27′, W. 17°, had rising barometer followed by falling barometer on the 30th, when the pressure reached 29.53 (750.0) at 4 p. m., near N. 52°, W. 20; on the 31st wind backed from nw. to ne., and the pressure fell to 29.40 (746.7) at midnight, near N. 51° 30′, W. 24°.

Additional reports from vessels in the vicinity of N. 47°, W. 25°, show the development of a storm of hurricane violence during the night of the 31st, in which the barometer fell below 28.70 (729.0). The description of this disturbance will be given in the April number of this REVIEW.

OCEAN ICE.

On chart i are also exhibited the positions at which icebergs and field ice have been observed during March, 1886. These positions are obtained from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers. During this month the easternmost icebergs were reported in W. 44° 40′, N. 47° 20′. Compared with the chart for the preceding month (February, 1886), it will be seen that the eastern limit of the ice region has not materially changed, while the southern limit has advanced southward nearly two degrees.

The amount of ice observed was considerably less than is usual in the month of March.

Icebergs and field ice were reported, as follows:

March 4th—S. S. "Blagdon," Thos. Dunn, commanding, passed through field ice in N. 47° 40′, W. 52° 28′, extending about twenty-five miles in length.

6th.—S. S. "Blagdon," in N. 44° 50′, W. 59° 10′, encountered another heavy field of ice, extending about fifty miles; was fourteen hours steaming through it.

12th.—S. S. "Durham City," in N. 44° 30′, W. 59° 16′, fell in with heavy field ice, extending as far as the eye could reach; at 1.20 p. m. the ice was so heavy that the steamer's course was turned to the southeast to clear it.

15th.—S. S. "Edam," J. H. Taat, commanding, observed icebergs in N. 47° 20′, W. 44° 40′; s. s. "Toledo" passed a large iceberg in N. 45° 24′, W. 47° 30′.

16th.—S. S. "Wells City," T. L. Weiss, commanding, in N. 45° 30′, W. 47° 20′, passed a large iceberg.

17th.—S. S. "Newfoundland" reports the bays of Newfoundland full of Arctic ice; also saw icebergs outside of Saint John's; steamed for ten hours through Gulf ice.

24th.—S. S. "Republic," P. J. Irving, commanding, in N. 44° 20′, W. 49° 02′, passed several small pieces of ice; air temperature, 34° Fahr.; water temperature, 33° Fahr.

27th.—S. S. "British Queen," R. Wills, commanding, in N. 45° 13′, W. 57° 36′, passed large quantities of field ice.

The s. s. "Geiser," at New York, March 22d, reports that navigation between Norwegian ports was very difficult on account of ice.

The following table shows the comparison of the iceberg limits between March, 1886, and the same month of the four preceding years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
March, 1882	42 30	50 00	March, 1882	46 30	46 00
March, 1883	41 46	49 48	March, 1883	48 40	43 03
March, 1884	41 20	54 06	March, 1884	45 00	40 15
March, 1885	40 55	49 04	March, 1885	45 57	43 15
March, 1886	40 20	49 02	March, 1886	47 20	44 40

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during March, 1886, eight reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; five messages were sent from Boston.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for March, 1886, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscellaneous data are given the monthly mean temperatures with the departures from the normal, for the various stations of the Signal Service.

In the lower lake region, New England, middle Atlantic states, and in the upper Mississippi and Ohio valleys, the mean temperatures for March, 1886, have differed but slightly from the normal. In the upper lake region and extreme northwest the month has been warmer than the average, the departures being most marked in the last named district, where they range from 2° to 6°. In all other districts the mean temperatures are below the normal, the departures being greatest in the central and southern Rocky Mountain regions, where they vary from 4° to 6°; in the west Gulf states the mean temperatures are from 3°.8 to 4°.9 below the normal.

The following are some of the most marked departures from the normal:

Above normal.		Below normal.	
	°		°
Moorhead, Minnesota	6.0	Denver, Colorado	6.2
Saint Vincent, Minnesota	4.5	Salt Lake City, Utah	5.4
Fort Buford, Dakota	3.0	Winnemucca, Nevada	5.3
Detroit, Michigan	3.0	Fort Thomas, Arizona	4.0
Escanaba, Michigan	2.6	Galveston, Texas	4.6
Alpena, Michigan	2.1	Fort Grant, Arizona	4.5
Port Huron, Michigan	1.9	Prescott, Arizona	4.5

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures for March for a series of years, the mean temperature for March, 1886, and the departures from the normal:

Station.	County.	Normal temperature for March.	Number of years.	Mean temperature for Mar., 1886.	Departure.
		°		°	°
Arkansas.					
Lead Hill	Boone	48.8	4	46.4	− 2.4
California.					
Fall Brook	San Diego	54.5	?	52.6	− 1.9
Sacramento	Sacramento	54.6	20	52.6	− 2.0
Connecticut.					
Middletown *	Middlesex	33.5	28	34.0	+ 0.5
New Haven *	New Haven	35.1	100	34.4	− 0.7
Dakota.					
Webster	Day	23.9	3	28.6	+ 4.7
Illinois.					
Anna	Union	45.0	11	43.8	− 1.2
Mattoon	Coles	37.6	6	40.5	+ 2.9
Riley	McHenry	29.9	25	30.2	+ 0.3
Sycamore	De Kalb	31.6	5	31.6	0.0
Indiana.					
Lafayette	Tippecanoe	36.1	7	37.8	+ 1.7
Vevay	Switzerland	42.8	21	43.3	+ 0.5
Iowa.					
Cresco	Howard	25.4	10	26.1	+ 0.7
Monticello	Jones	32.4	32	30.2	− 2.2
Kansas.					
Independence	Montgomery	44.9	15	43.1	− 1.8
Wellington	Sumner	42.8	8	42.1	− 0.7
Yates Centre	Woodson	37.3	6	40.5	+ 3.2
Maine.					
Belfast *	Waldo	29.8	27	28.5	− 1.3
Bridgeton *	Cumberland	27.7	11	27.0	− 0.7
Gardiner	Kennebec	29.4	50	28.8	− 0.6
Orono *	Penobscot	26.8	18	26.9	+ 0.1
Maryland.					
Fallston	Harford	38.2	16	39.4	+ 1.2
Massachusetts.					
Amherst *	Hampshire	32.6	49	33.8	+ 1.2
Cambridge *	Middlesex	33.9	64	32.7	− 1.2
Fitchburg *	Worcester	30.5	30	30.4	− 0.1
Lowell *	Middlesex	32.8	10	32.8	0.0
New Bedford *	Bristol	35.0	74	33.5	− 1.5
Somerset	Bristol	34.0	16	35.1	+ 1.1
Springfield *	Hampden	32.7	19	34.4	+ 1.7
Williamstown *	Berkshire	30.4	33	30.2	− 0.2
Worcester *	Worcester	33.5	48	31.2	− 2.3
Nevada.					
Carson City	Ormsby	40.1	7	38.7	− 1.4
New Brunswick.					
Saint John *	Saint John	27.4	26	27.2	− 0.2
New Hampshire.					
Concord *	Merrimac	36.5	18	32.1	− 4.4
Hanover *	Grafton	27.2	25	27.6	+ 0.4
New Jersey.					
South Orange	Essex	36.0	16	37.7	+ 1.7
New York.					
North Volney	Oswego	28.2	19	30.3	+ 2.1
Palermo	Oswego	28.0	33	28.2	+ 0.2
Plattsburg Barracks	Clinton	25.6	17	26.4	+ 0.8
Ohio.					
Wauseon	Fulton	32.3	16	34.5	+ 2.2
Pennsylvania.					
Dyberry	Wayne	29.0	22	31.2	+ 2.2
Wellsborough	Tioga	31.8	5	36.0	+ 4.2
South Carolina.					
Stateburg	Sumpter	53.3	6	53.1	− 0.2
Texas.					
New Ulm	Austin	62.9	14	58.7	− 4.2
Vermont.					
Lunenburg *	Essex	25.8	38	25.2	− 0.6
Strafford *	Orange	26.3	12	25.9	− 0.4
Virginia.					
Bird's Nest	Northampton	46.2	18	46.8	+ 0.6
Dale Enterprise	Rockingham	48.3	6	44.7	− 3.6
Variety Mills	Nelson	44.1	9	43.5	− 0.6
Wytheville	Wythe	42.6	22	42.4	− 0.2
West Virginia.					
Helvetia	Randolph	39.1	10	38.6	− 0.5

* From the "Bulletin of the New England Meteorological Society."

The following notes in connection with this subject are furnished by voluntary observers:

California.—Fall Brook, San Diego county: the highest mean temperature for March during the past eight years was 58°.8, in 1883, and the lowest, 47°.8, in 1880.

Iowa.—Monticello, Jones county: the maximum temperature that has occurred in any March for a period of thirty-two years was 78°.0, in 1854, and the minimum, 14°.0, in 1873.

Kansas.—Wellington, Sumner county: the maximum temperature that has occurred in March during the past eight years was 82°.0, in 1881, and the minimum, 0°.0, in 1880.

Yates Centre, Woodson county: the maximum temperature for March, 1886, 86°.3, is the highest for March during the past seven years; the highest temperature previously recorded in March in this time was 78°.5, and this has been exceeded three times during the past month.

Maine.—Gardiner, Kennebec county: the mean temperature for the four months ending March 31, 1886, was 23°.68, or 1°.3 above the average for the corresponding period during the past forty-eight years.

Maryland.—Fallston, Harford county: the highest mean temperature that has occurred in any March for a period of sixteen years was 46°.2, in 1871, and the lowest, 30°.6, in 1885.

Massachusetts.—Worcester, Worcester county: the mean temperature for March, 1886, was 3° below the normal; the mean temperature of the five cold months ending March 31, 1886, was about normal when compared with the preceding forty-seven winters.

New York.—North Volney, Oswego county: the highest mean temperature for March during a period of nineteen years was 37°.4, in 1878, and the lowest, 18°.6, in 1885.

Ohio.—Wauseon, Fulton county: the highest March mean temperature for a period of sixteen years was 42°.3, in 1878, and the lowest, 26°.5, in 1877; the extremes during this period were 79°.5, in 1875, and —17°.4, in 1883. The mean temperature for the five months ending March 31, 1886, was 29°.1, or 0°.5 above the normal.

Texas.—New Ulm, Austin county: the highest mean temperature for March in a period of fourteen years was 68°.4, in 1879, and the lowest, 58°.0, in 1885; the extremes during this time were 96°.0, in 1879, and 30°.0, in 1873, 1875, 1880.

Virginia.—Variety Mills, Nelson county: the highest mean temperature for March that has occurred in the past nine years was 51°.6, in 1878, and the lowest, 37°.1, in 1885.

In the following table are given the mean temperatures for the several geographical districts, with the normals and departures, as deduced from Signal Service observations:

Average temperatures for March.

Districts.	Average for Mar. Signal-Service observations.		Comparison of Mar., 1886, with the average for several years.
	For several years.	For 1886.	
	°	°	°
New England	33.0	32.5	— 0.5
Middle Atlantic States	40.5	40.5	0.0
South Atlantic States	53.9	51.9	— 2.0
Florida Peninsula	66.2	63.1	— 3.1
Eastern Gulf States	57.6	54.8	— 2.8
Western Gulf States	59.4	55.4	— 4.0
Rio Grande Valley	69.4	67.3	— 2.1
Tennessee	49.9	48.2	— 1.7
Ohio Valley	41.8	41.4	— 0.4
Lower Lake region	32.6	33.0	+ 0.4
Upper Lake region	27.1	28.2	+ 1.1
Extreme Northwest	30.1	33.2	+ 3.1
Upper Mississippi Valley	37.2	36.7	— 0.5
Missouri Valley	33.7	31.4	— 2.3
Northern slope	32.8	30.1	— 2.7
Middle slope	40.8	37.2	— 3.6
Southern slope	54.4	52.1	— 2.3
Southern plateau	52.4	47.9	— 4.5
Middle plateau	41.8	36.5	— 5.3
Northern plateau			
North Pacific coast region	46.5	44.1	— 2.4
Middle Pacific coast region	53.2	50.9	— 2.3
South Pacific coast region	59.0	56.6	— 2.4

RANGES OF TEMPERATURE.

The monthly, and the greatest and least daily ranges of temperature, are given in the tables of miscellaneous meteorological data.

The following are some of the greatest and least monthly ranges:

Greatest.		Least.	
	°		°
Fort Elliott, Texas	37.7	Tatoosh Island, Washington Territory	18.9
Fort Shaw, Montana	36.8	Cape Mendicino, California	19.0
Fort Benton, Montana	35.5	Fort Canby, Washington Territory	20.8
Fort Assinnaboine, Montana	33.7	San Diego, California	27.5
Valentine, Nebraska	32.9	Key West, Florida	29.0
Poplar River, Montana	31.5	Pysht, Washington Territory	29.0
North Platte, Nebraska	31.0	Port Angeles, Washington Territory	29.0

FROSTS.

Frosts occurred in the various districts on the following dates:

***New England.*—1st to 30th.**

***Middle Atlantic states.*—1st to 31st.**

***South Atlantic states.*—1st to 12th, 14th, 17th, 18th, 19th, 22d to 30th.**

***Florida.*—Manatee, 2d; Archer, 2d, 11th; Sanford, Limona, and Fort Gatlin, 11th.**

***East Gulf states.*—2d, 3d, 4th, 10th, 11th, 14th, 23d, 31st.**

***West Gulf states.*—8th, 10th, 11th, 13th, 21st, 22d, 30th, 31st.**

***Tennessee.*—1st to 4th, 7th to 14th, 23d, 24th, 30th, 31st.**

***Ohio Valley.*—1st to 11th, 13th, 14th, 17th, 18th, 20th, 22d, 23d, 24th, 28th, 31st.**

***Lower lake region.*—1st to 20th, 22d to 30th.**

***Upper lake region.*—1st to 31st.**

***Extreme northwest.*—1st to 31st.**

***Upper Mississippi valley.*—1st to 31st.**

***Missouri Valley.*—1st to 31st.**

***Northern slope.*—1st to 31st.**

***Middle slope.*—1st to 23d, 26th to 31st.**

***Southern slope.*—1st, 4th to 18th, 20th, 21st, 22d, 26th, 28th to 31st.**

***Southern plateau.*—1st to 9th, 11th to 17th, 19th to 22d, 26th to 31st.**

Table of comparative maximum and minimum temperatures for March.

State or Territory.	Station.	For 1886.		Since establishment of station.			
		Max.	Min.	Max.	Year.	Min.	Year.
		°	°	°		°	
Alabama	Mobile	75.0	34.0	85.0	1879	29.0	1885
Do	Montgomery	77.2	29.9	86.3	1882	23.0	1873
Arizona	Fort Apache	76.0	13.6	83.0	1879	11.0	1881
Do	Prescott	69.7	12.3	90.0	1879	— 8.0	1876
Arkansas	Little Rock	79.0	23.0	83.0	1882	27.1	1885
Do	Fort Smith	82.0	25.2	76.4	1883	1.0	1885
California	San Diego	68.2	40.7	99.0	1879	38.0	1880
Do	San Francisco	73.1	41.0	77.0	1879	39.0	1880
Colorado	Denver	68.0	—10.7	81.0	1879	—10.0	1880
Do	Pike's Peak	26.6	—16.1	43.0	1879	—29.0	1875
Connecticut	New Haven	58.6	1.4	69.0	1880	— 0.2	1885
Do	New London	55.6	4.5	64.0	1878	6.0	1883, 1885
Dakota	Fort Buford	69.1	—10.5	70.0	1879, 1882	—23.0	1880
Do	Yankton	58.8	— 6.1	87.0	1879	—16.0	1876, 1880
Delaware	Del. Breakwater			73.0	1880	15.3	1884
Do	Cape Henlopen	54.0	24.8				
District of Columbia	Washington City	66.9	13.2	79.0	1880	4.0	1873
Florida	Jacksonville	83.6	37.0	88.0	1882	31.0	1873, 1870
Do	Key West	82.0	53.0	89.0	1873, 1874	53.0	1873
Georgia	Augusta	82.0	25.6	89.3	1882	22.0	1873
Do	Savannah	77.0	33.0	87.0	1882	27.0	1873
Idaho	Boisé City			76.0	1881	9.0	1882
Illinois	Cairo	78.7	22.6	84.0	1879	10.0	1873
Do	Chicago	69.9	15.3	73.0	1875	—12.0	1873
Indiana	Indianapolis	75.0	15.6	77.0	1875	2.0	1873
Indian Territory	Fort Sill	88.0	23.3	95.0	1879	10.0	1880
Iowa	Davenport	68.2	4.0	74.0	1875	— 8.0	1884
Do	Keokuk	76.2	12.1	80.0	1875	2.0	1873
Kansas	Dodge City	75.5	8.8	89.0	1879	— 8.0	1880
Do	Leavenworth	80.3	8.8	80.0	1878	2.0	1876
Kentucky	Louisville	77.2	22.5	79.0	1879	3.0	1873
Louisiana	New Orleans	80.8	40.1	84.0	1879	36.0	1885
Do	Shreveport	83.0	29.4	90.0	1882	26.0	1870
Maine	Eastport	49.3	— 7.9	53.0	1878	— 5.2	1885
Do	Portland	49.1	— 3.8	65.0	1874	— 7.0	1872
Maryland	Baltimore	70.6	14.6	76.0	1880	5.0	1873
Massachusetts	Boston	64.3	— 1.2	72.0	1880	— 7.5	1872
Michigan	Alpena	48.2	— 5.3	66.0	1879	—19.0	1884
Do	Detroit	61.0	5.9	75.0	1875	— 7.0	1872
Minnesota	Saint Paul	58.0	— 9.8	68.0	1879	—22.5	1873
Do	Saint Vincent	44.1	—12.6	49.0	1881	—31.0	1883
Mississippi	Vicksburg	83.0	28.9	85.0	1878, 1880	27.0	1876, 1885
Missouri	Saint Louis	81.2	23.0	82.0	1879	8.0	1873, 1876
Montana	Fort Benton	68.7	—16.8	74.0	1882	—42.0	1876
Do	Helena	62.5	—10.0	66.0	1881	— 9.0	1874
Nebraska	Omaha	63.6	— 1.4	82.0	1879	— 7.0	1880
Do	North Platte	73.0	— 8.0	86.0	1879	—21.0	1880
Nevada	Winnemucca	68.3	15.6	82.0	1879	— 3.0	1882
New Hampshire	Mount Washington	44.0	—37.2	47.0	1876	—49.0	1872
New Jersey	Atlantic City	67.5	10.6	72.0	1880	8.0	1884
Do	Sandy Hook	60.1	9.1	63.6	1884	6.9	1884
New Mexico	Santa Fé	65.5	4.0	82.0	1879	0.0	1880
New York	Buffalo	68.5	0.7	72.0	1875	— 4.1	1885
Do	New York City	60.1	7.4	69.0	1874	— 4.0	1873
North Carolina	Charlotte	76.0	24.4	79.0	1879, 1880	23.0	1884
Do	Wilmington	78.1	28.8	84.0	1878	20.0	1873
Ohio	Cleveland	73.8	7.4	76.0	1875	— 4.4	1885
Do	Cincinnati	75.1	17.3	77.0	1875	1.0	1873
Oregon	Portland	79.0	30.0	76.5	1881	25.5	1880
Do	Roseburg	73.8	28.3	80.0	1881, 1883	19.0	1880
Pennsylvania	Philadelphia	67.2	8.1	75.0	1880	5.0	1872
Do	Pittsburg	70.6	11.4	80.0	1876	2.0	1873, 1877
Rhode Island	Block Island	56.0	5.8	55.3	1882	10.0	1881, 1882
South Carolina	Charleston	75.9	30.5	83.0	1878	25.0	1873
Tennessee	Knoxville	75.8	23.3	83.0	1882	6.0	1873
Do	Memphis	81.0	30.7	85.0	1879	18.0	1876
Texas	Galveston	70.6	37.8	85.0	1879	34.0	1875
Do	El Paso	82.3	29.0	88.0	1879, 1882	21.0	1880
Utah	Salt Lake City	67.9	18.1	77.0	1879	5.0	1880
Virginia	Lynchburg	77.8	22.9	79.0	1879	6.0	1873
Do	Norfolk	76.8	21.0	81.0	1880	25.0	1883
Washington Ter	Dayton			83.0	1881	8.0	1880
Do	Olympia	65.2	23.1	71.0	1881	23.0	1880
Wisconsin	La Crosse	54.3	— 0.3	72.0	1875	—23.0	1873
Do	Milwaukee	58.8	8.8	70.0	1878	— 8.5	1884
Wyoming	Cheyenne	66.1	—15.9	77.0	1879	—17.0	1880

Middle plateau.—1st, 2d, 3d, 5th to 16th, 18th to 26th, 28th to 31st.

Northern plateau.—1st, 2d, 3d, 5th, 6th, 8th, 10th, 11th, 12th, 14th, 17th to 20th, 24th to 30th.

North Pacific coast region.—1st to 8th, 10th, 11th, 14th, 17th, 18th, 19th, 23d to 30th.

Middle Pacific coast region.—1st, 2d, 3d, 6th to 12th, 15th, 16th, 18th, 19th, 20th, 22d, 25th.

South Pacific coast region.—10th, 11th, 12th, 19th, 20th, 21st.

ICE.

Ice formed in the southern parts of the country during the month, as follows:

Raleigh, North Carolina, 3d, 11th.
Birmingham, Alabama, 10th, 11th.
Stateburg, South Carolina, 11th.
Savannah and Milledgeville, Georgia, 11th, 24th.
Mobile, Alabama, 11th.
Los Angeles, California, 19th.
San Carlos, Arizona, 20th.
Lenoir, North Carolina, 23d.
Chapel Hill, North Carolina, 24th.
Palestine and Abilene, Texas, 30th.
Liberty Hill, Louisiana, 31st.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada for March, 1886, as determined from the reports from more than seven hundred stations, is exhibited on chart iii.

In the following table are shown, for the several geographical districts, the normal precipitation for March; the average for March, 1886, and the excess or deficiency as compared with the normal:

Average precipitation for March.

Districts.	Average for March, Signal-Service observations.		Comparison of March, 1886, with the average for several years.
	For several years.	For 1886.	
	Inches.	*Inches.*	*Inches.*
New England	4.22	3.73	−0.49
Middle Atlantic States	3.98	3.50	−0.48
South Atlantic States	5.11	5.66	+0.55
Florida Peninsula	2.39	7.09	+4.70
Eastern Gulf States	6.32	10.47	+4.15
Western Gulf States	3.93	4.51	+0.58
Rio Grande Valley	1.14	1.33	+0.19
Tennessee	5.80	7.92	+2.12
Ohio Valley	3.67	3.02	−0.65
Lower lake region	2.84	2.78	−0.06
Upper lake region	2.18	2.78	+0.60
Extreme northwest	1.03	0.77	−0.26
Upper Mississippi Valley	2.33	2.19	−0.14
Missouri Valley	1.42	1.66	+0.24
Northern slope	0.76	0.96	+0.20
Middle slope	0.88	1.11	+0.23
Southern slope	1.05	0.60	−0.45
Southern plateau	1.13	0.99	−0.14
Middle plateau	1.34	1.71	−0.37
North Pacific coast region	4.94	4.16	−0.78
Middle Pacific coast region	2.86	2.04	−0.82
South Pacific coast region	1.52	2.19	+0.67

In eastern Tennessee, the east Gulf states, and Florida, the rainfall was largely in excess of the average, being due principally to the remarkably heavy rains which fell during the closing days of the month. In Florida the rainfall was more than double the average, and in the east Gulf states the excess amounted to about two-thirds of the average. In Tennessee the rainfall exceeded the average by more than two inches, although there was a marked deficiency in the western part of the state. In the other districts no marked departures from the average rainfall are shown.

Concerning the unusually heavy rains of the last days of the month, the following notes from observers' reports are given:

Atlanta, Georgia: the rainfall during March, 11.16 inches, is the largest amount which has fallen at this station in March since 1880; of the total for the month, about ten inches fell from the 28th to 31st.

Knoxville, Tennessee: during the thirty-nine and one-half hours ending at 8.38 a. m. of the 31st, 6.56 inches of rain fell; this is the heaviest fall of rain that has occurred since February 24–25th, 1875, when 8.10 inches fell.

Chattanooga, Tennessee: on the 30th 5.95 inches of rain fell, this amount being the largest recorded in the same length of time since the establishment of this station in 1879.

Mr. J. W. A. Wright, voluntary observer at Greensborough, Hale county, Alabama, reports that the rainfall (11.72) for March exceeded by 1.72 inches the largest quantity previously recorded at that place in March; of the total rainfall for the month, more than eight inches fell in less than sixty consecutive hours, from the 28th to 31st.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported by voluntary observers, the average precipitation for the month of March for a series of years; the precipitation for March, 1886; and the departures from the average:

Station.	County.	Average precipitation for March.	Number of years.	Precipitation for March, 1886.	Departure.
Arkansas.		*Inches.*		*Inches.*	*Inches.*
Lead Hill	Boone	3.64	4	4.87	+ 1.23
California.					
Fall Brook	San Diego	2.79	?	4.70	+ 1.91
Sacramento	Sacramento	2.77	12	2.33	− 0.44
Connecticut.					
Hartford	Hartford	4.05	15	3.51	− 0.54
Middletown *	Middlesex	4.41	38	3.44	− 0.97
New Haven *	New Haven	4.77	14	3.20	− 1.57
Wallingford *	New Haven	4.63	28	3.67	− 0.96
Dakota.					
Webster	Day	2.60	3	2.02	− 0.58
Illinois.					
Anna	Union	3.96	11	4.05	+ 0.09
Mattoon	Coles	3.44	6	3.55	+ 0.11
Riley	McHenry	2.53	25	3.68	+ 1.15
Sycamore	De Kalb	2.38	5	3.85	+ 1.47
Indiana.					
Lafayette	Tippecanoe	2.37	7	2.04	− 0.33
Vevay	Switzerland	4.03	21	2.18	− 1.85
Iowa.					
Cresco	Howard	1.96	10	2.04	+ 0.08
Monticello	Jones	2.48	32	3.50	+ 1.02
Kansas.					
Independence	Montgomery	2.09	14	1.68	− 0.41
Wellington	Sumner	1.36	8	1.59	+ 0.23
Yates Centre	Woodson	1.29	6	1.83	+ 0.54
Maine.					
Gardiner	Kennebec	3.88	48	3.90	+ 0.12
Orono	Penobscot	3.95	18	2.87	− 1.08
Maryland.					
Fallston	Harford	4.01	16	6.03	+ 2.02
Massachusetts.					
Amherst *	Hampshire	3.39	51	3.52	+ 0.13
Cambridge *	Middlesex	3.79	45	3.53	− 0.26
Chestnut Hill *	Middlesex	4.24	11	3.55	− 0.69
Framingham *	Middlesex	4.32	12	3.59	− 0.73
Lake Cochituate *	Middlesex	4.12	35	3.46	− 0.66
Lowell *	Middlesex	3.47	61	3.26	− 0.21
Lynn *	Essex	4.40	12	3.70	− 0.70
Mystic Lake *	Middlesex	4.18	11	3.96	− 0.22
New Bedford *	Bristol	4.21	73	5.09	+ 0.97
Somerset	Bristol	4.59	16	4.09	− 0.50
Springfield *	Hampden	3.01	39	3.76	+ 0.15
Waltham *	Middlesex	3.42	62	3.57	+ 0.15
Williamstown *	Berkshire	3.08	22	5.01	+ 1.93
Worcester *	Worcester	3.67	46	3.57	− 0.10
Nevada					
Carson City	Ormsby	1.83	7	1.60	− 0.23
New Brunswick.					
Saint John *	Saint John	4.82	26	3.16	− 1.66
New Hampshire.					
Concord *	Merrimac	2.95	31	3.27	+ 0.32
Hanover *	Grafton	2.12	19	2.13	+ 0.01
New Jersey.					
South Orange	Essex	3.68	16	3.47	− 0.21
New York.					
North Volney	Oswego	3.06	14	3.25	+ 0.19
Palermo	Oswego	2.82	33	1.68	− 1.14
Plattsburg Barracks	Clinton	2.27	17	1.42	− 0.85
Ohio.					
Wauseon	Fulton	3.10	13	1.56	− 1.54
Pennsylvania.					
Dyberry	Wayne	3.05	18	3.51	+ 0.46
South Carolina.					
Kirkwood	Kershaw	3.28	31	3.40	+ 0.12
Stateburg	Sumpter	4.06	6	4.40	+ 0.34
Texas.					
New Ulm	Austin	5.34	14	4.75	− 0.59
Vermont.					
Lunenburg *	Essex	3.34	38	0.90	− 2.44
Strafford *	Orange	3.28	12	2.20	− 1.08
Virginia.					
Bird's Nest	Northampton	4.79	18	2.85	− 1.94
Dale Enterprise	Rockingham	2.92	6	6.86	+ 3.94
Variety Mills	Nelson	3.90	7	6.16	+ 2.26
Wytheville	Wythe	3.71	22	5.31	+ 1.60
West Virginia.					
Helvetia	Randolph	4.75	10	4.46	− 0.29

* From the "Bulletin of the New England Meteorological Society."

The following notes in connection with this subject are reported by voluntary observers:

California.—Fall Brook, San Diego county: the greatest precipitation for any March for a period of ten years was 10.90, in 1884, and the least, 0.29, in 1879 and 1885.

Illinois.—Mattoon, Coles county: the total snowfall for March, 1886, 10.00, is 5.94 above the average for six years.

Indiana.—Vevay, Switzerland county: the total snowfall for March, 1886, 0.02, is 2.74 below the average for the past twenty-one years.

Iowa.—Cresco, Howard county: the total snowfall for March, 1886, 19.50, is 13.50 above the average for the past ten years.

Monticello, Jones county: the greatest precipitation that has occurred in any March for a period of thirty-two years was 6.54, in 1877, and the least, 0.07, in 1869. The total snowfall for March, 1886, 19.90, is 12.67 above the average for thirty-two years; the greatest snowfall in any March was 26.60, in 1876; no snow fell in March, 1877.

Kansas.—Yates Centre, Woodson county: the snowfall for the five months ending March 31st was 22.80, being the largest amount in the past seven years; for the same time the least was 3.00, in 1879–'80.

Wellington, Sumner county: the total snowfall for March, 1886, 4.5, is 2.0 above the average for eight years.

Maine.—Gardiner, Kennebec county: the total snowfall for the past winter was 79.5, being a deficiency of about 4.0. The largest snowfall in any winter for the past forty-eight years was 146.0, in 1842–'43, and the least, 31.0, in 1837–'38. The total precipitation for the quarter ending March 31, 1886, was 17.76, being 7.0 in excess of the average.

Maryland.—Fallston, Harford county: the greatest precipitation that has occurred in any March for the past sixteen years was 7.53, in 1871, and the least, 1.44, in 1885.

Massachusetts.—Worcester, Worcester county: the precipitation during March, 1886, was about normal, although the snowfall was far below the average of the preceding forty-five years.

New York.—Palermo, Oswego county: the total snowfall for March, 1886, 3.75, is 10.0 below the average for thirty-three years. The greatest snowfall that has occurred in any March during this period was 37.0, in 1870, and the least, 2.50, in 1882.

Ohio.—Wauseon, Fulton county: the total snowfall for March, 7.3, is 5.0 below the average.

Pennsylvania.—Dyberry, Wayne county: the snowfall for March, 1886, is below the normal, the average for a period of thirty-two years being 14.7.

Texas.—New Ulm, Austin county: the greatest precipitation that has occurred in any March during the past fourteen years was 13.13, in 1883, and the least, 2.14, in 1885.

Virginia.—Variety Mills, Nelson county: the greatest precipitation for March during the past seven years was 8.78, in 1884, and the least, 0.63, in 1879.

The following are some of the most marked departures from normal precipitation at Signal Service stations:

Above normal.	Inches.	Below normal.	Inches.
Pensacola, Florida	8.97	Cape Henry, Virginia	4.13
Cedar Keys, Florida	8.97	Hatteras, North Carolina	3.32
Mobile, Alabama	6.84	Eastport, Maine	3.06
Chattanooga, Tennessee	6.51	Memphis, Tennessee	2.96
Sanford, Florida	5.89	Nashville, Tennessee	2.49
Knoxville, Tennessee	5.41	Norfolk, Virginia	2.32
Atlanta, Georgia	4.41	New Haven, Connecticut	1.69
Jacksonville, Florida	3.47	Boston, Massachusetts	1.51

SNOW.

Snow fell in the various districts during the month, as follows:

***New England.*—1st, 2d, 3d, 5th, 6th, 7th, 8th to 23d, 25th to 31st.**

***Middle Atlantic states.*—1st, 2d, 3d, 5th, 6th, 8th to 14th, 19th, 21st, 22d, 23d, 25th to 31st.**

***South Atlantic states.*—9th, 10th, 23d, 27th.**

***East Gulf states.*—Greensborough, Alabama, 10th; Birmingham, Alabama, 31st.**

***West Gulf states.*—Lead Hill, Arkansas, 7th, 9th, 20th, 30th, 31st; Fort Smith, Arkansas, 29th; Little Rock, Arkansas, 30th.**

***Tennessee.*—9th, 10th, 29th, 30th, 31st.**

***Ohio Valley.*—1st, 4th to 14th, 21st, 22d, 23d, 25th to 28th, 30th, 31st.**

***Lower lake region.*—1st to 5th, 7th to 16th, 19th to 24th, 31st.**

***Upper lake region.*—1st, 2d, 5th, 7th to 23d, 25th to 31st.**

***Extreme northwest.*—1st to 5th, 7th, 8th, 10th to 14th, 16th to 19th, 26th to 29th, 31st.**

Table of excessive and greatest monthly precipitation for March, 1886.

Station.	Specially heavy. Date.	Specially heavy. Amt.	Largest monthly. Amount.
Alabama.			
Newton	4	2.20	18.05
Do	20	3.00	
Do	27, 28	4.70	
Do	30	3.20	
Mobile	4	2.29	14.62
Do	28	2.00	
Do	30	3.93	
Centre	26 to 30	12.15	13.90
Valley Head	27	2.24	12.78
Do	29, 30	6.94	
Lineville	29, 30	11.00	12.30
Bermuda	20	2.20	12.00
Do	30	4.50	
Grove Hill	29, 30	5.20	11.90
Russellville	29	9.75	11.74
Greensborough	26 to 31	9.28	11.72
Carrollton	27 to 30	10.45	11.60
Birmingham	26, 27	2.16	11.51
Do	29, 30, 31	7.81	
Tuscaloosa	27 to 30	9.33	11.31
Marion	29, 30	7.35	11.19
Springfield	29, 30	7.03	10.90
Selma	29, 30	7.45	10.19
Jacksonville	28, 29, 30	7.50	10.00
Gadsden	29, 30	8.10	9.30
Evergreen	30	2.92	8.58
Auburn	28, 29, 30	5.48	8.03
Mount Willing	30	3.50	8.49
Eufaula	30	2.85	7.94
Mt. Vernon B'ks	27, 28	2.34	7.59
Oswichee	30	2.32	7.45
Trinity	29, 30	4.70	7.05
Montgomery	29, 30	3.67	6.86
Arizona.			
Prescott	1, 2	2.41	
Arkansas.			
Lead Hill	25, 26	2.20	
California.			
Summit			7.80
Cisco			7.40
Emigrant Gap			6.90
Blue Lake			6.51
Murietta	1, 2, 3	3.87	
Fall Brook	1, 2	2.78	
Connecticut.			
New London	20, 21	2.24	
Dist. of Columbia.			
Washington City	30, 31	3.12	6.41
Florida.			
Pensacola	4	2.60	13.37
Do	30	2.29	
Do	27, 28	4.01	
Archer	4, 5	2.85	12.33
Do	12, 13	3.25	
Cedar Keys	4, 5	2.26	12.14
Do	12, 13	2.89	
Do	16	2.47	
Tallahassee			9.79
Sanford	4, 5	2.39	8.17
Do	15, 16	2.23	
Ft. St. Augustine	4, 5	2.35	7.61
Jacksonville	4, 5	2.64	6.74
Limona	20, 21	2.99	
Fort Meade	21	4.00	
Georgia.			
Dahlonega			13.47
Atlanta	29, 30	9.59	11.16
Athens	28 to 31	8.50	9.74
Quitman			9.10
Forsyth	28 to 31	5.85	8.67
Augusta	29	4.84	7.42
Milledgeville	29	3.80	
Iowa.			
Clinton	20 to 21	2.61	
Louisiana.			
New Orleans	3, 4	2.50	8.41
Do	29, 30	2.70	
Luling	3, 4	2.15	6.94
Shreveport	25	2.65	6.32
Grand Coteau	2, 3	2.62	
Maryland.			
Fallston	27 to 31	4.65	6.03
Emmittsburg	29, 30, 31	3.47	

Station.	Specially heavy. Date.	Specially heavy. Amt.	Largest monthly. Amount.
Maryland—Con.			
Fort McHenry	29, 30, 31	3.80	
Baltimore	30, 31	2.05	
Massachusetts.			
New Bedford	19, 20	2.85	
Michigan.			
Harrisville	19, 20	2.70	
Manistique	20	2.52	
Alpena	21	2.15	
Mississippi.			
Vicksburg	27, 28	2.48	6.07
Nebraska.			
Fremont	27, 28	2.00	
New Jersey.			
Egg Harbor City	27	2.38	
North Carolina.			
Flat Rock	20, 21	2.05	8.64
Do	29, 30	4.90	
Charlotte	29, 30, 31	3.80	6.39
Chapel Hill	29, 30, 31	4.25	
Weldon	29, 30, 31	2.98	
Wake Forest	29, 30, 31	2.99	
Raleigh	29, 30, 31	3.20	
Lincolnton	29, 30, 31	3.80	
Wilmington	31	3.37	
Smithville	31	2.06	
Oregon.			
Bandon	22	2.43	
Pennsylvania.			
Westborough	29, 30, 31	6.03	8.25
Mahanoy Plane	28 to 31	5.25	7.59
Rhode Island.			
Narragansett P'r	20, 21	2.50	
South Carolina.			
Spartanburg	26 to 31	4.60	7.07
Pacolet	19, 20	2.28	6.43
Do	29, 30	3.34	
Stateburg	29, 30, 31	3.66	
Aiken	29, 30	3.64	
Tennessee.			
Chattanooga	29, 30	9.15	12.77
Grief	27	2.07	11.33
Do	29, 30, 31	7.50	
Knoxville	30	5.56	11.15
Parkersville	29, 30	7.09	10.72
Andersonville	20	2.25	10.17
Do	20, 30	6.00	
Fostoria	25	2.00	9.40
Do	30, 31	6.40	
Paris	26	3.60	9.38
Do	28, 29	3.80	
Farmingdale	29, 30	5.00	8.94
Jacksonborough	27, 28	3.20	8.20
Do	30, 31	3.45	
Howell	29, 30	4.49	8.12
Careyville	29, 30	5.00	7.45
Manchester	29, 30	3.62	7.29
Rogersville	30	3.10	7.08
Beach Grove	29, 30	3.45	6.92
Biddleton	29, 30	2.94	6.71
Waynesborough	29, 30	5.00	6.70
Cookville	30	2.00	6.64
Greenville	29, 30	3.60	6.53
Nashville	29, 30	3.48	
Texas.			
Austin	2, 3	2.05	
Indianola	2, 3	2.14	
Virginia.			
Dale Enterprise	26, 27	2.25	6.68
Do	29, 30, 31	3.58	
Accotink	29, 30, 31	4.00	6.65
Fort Myer	31	2.12	6.48
Variety Mills	29, 30, 31	3.55	6.16
Lynchburg	30, 31	2.60	
Washington Ter.			
Neah Bay	12, 13	2.30	12.90
Do	19 to 23	5.40	
Tatoosh Island			10.89
Fort Canby			8.26
Pysht			7.91
Astoria			7.23
Wisconsin.			
Madison	20, 21	2.50	

***Upper Mississippi valley.*—1st, 4th to 15th, 20th, 21st, 26th to 31st.**

***Missouri Valley.*—1st to 9th, 11th to 15th, 17th to 21st, 26th to 31st.**

***Northern slope.*—1st to 21st, 23d, 25th to 31st.**

***Middle slope.*—1st to 11th, 14th, 17th to 20th, 25th to 30th.**

***Southern slope.*—Abilene and Fort Davis, Texas, Fort Sill, Indian Territory, and Fort Stanton, New Mexico, 29th.**

***Southern plateau.*—1st, 2d, 3d, 10th, 11th, 14th, 18th, 19th, 28th, 29th.**

***Middle plateau.*—1st to 19th, 24th to 27th, 29th, 30th, 31st.**

***Northern plateau.*—2d to 10th, 13th to 18th, 23d, 26th, 31st.**

North Pacific coast region.—15th, 16th, 17th, 23d.

Middle Pacific coast region.—2d, 3d, 4th, 15th, 16th, 17th.

Snow storms of unusual severity were reported, as follows:

Saint Paul, Minnesota: a heavy snow storm occurred on the 20th, causing the stoppage of street cars and greatly delaying railroad traffic.

Riley, McHenry county, Illinois: the snowfall of the 31st was the greatest (so late in the season) in this county for the past fifty-one years.

North Platte, Nebraska: a severe snow storm occurred on the 27-28th, accompanied by a cold north wind, which drifted the snow badly; trains on the Union Pacific Railroad were delayed, and considerable loss to cattle was reported by stockmen.

LARGEST MONTHLY SNOWFALLS.

[*Expressed in inches and tenths.*]

Monthly snowfalls of three inches or more were reported from the various states and territories during the month, as follows:

Arizona.—Prescott, 16.2.

California.—Summit, 78; Cisco, 74; Emigrant Gap, 69; Towles, 51; Boca, 44; Truckee, 29; Tehichipa, 26; Susanville, 16.5; Fort Bidwell, 13.7; Kerne, 11; Blue Lake, 9.5; Colfax and Ravenna, 7.

Colorado.—Pike's Peak, 41.8; Denver, 21.8; Colorado Springs, 6; Pueblo, 4.6.

Connecticut.—North Colebrook, 22; Norfolk, 17; Canton, 9; Collinsville, 5; New London, 4.2; Wallingford, 3.5; Bethel, 3.

Dakota.—Richardton, 26; Deadwood, 25.1; Vermillion, 25; Yankton, 23.6; Bismarck, 10.4; Fort Totten, 8.4; Fort Buford, 7.9; Webster, 7.2; Huron, 4.7.

Illinois.—Riley, 18.5; Rockford, 17.9; Sycamore and Pekin, 15.2; Windsor, 13.8; Geneseo, 13.2; Charleston, 12.4; Beardstown, 12; Mattoon, 10; Bunker Hill, 8.4; Springfield, 5.7; Anna, 5.4.

Indiana.—Connersville, 9.5; Princeton, 8; Sunman, 7.7; Greencastle, 7.4; La Grange, 6.8; Spiceland, 6.3; Mauzy, 6; Farmland, 4.5; Monticello, 4.4; Lafayette and Worthington, 4.2; Knightstown, 3.5; Greenfield, 3.2; Blue Lick, 3.1; Guilford, Fort Wayne, and Marengo, 3.

Iowa.—Clinton, 28; Monticello, 19.9; Cresco, 19.5; Muscatine, 19; Davenport and Fort Madison, 18.5; Keokuk, 16.5; Des Moines *a*, 16.3; Cedar Rapids, 14.3; Des Moines *b*, 13; Independence, 12.8; Oskaloosa *a*, 9.9; Oskaloosa *b*, 7.

Kansas.—Concordia, 15.4; Wakefield, 12; Westmoreland, 10.5; Fort Scott, 10; Atchison, 9.6; Allison, 8.9; El Dorado, 7.1; Manhattan *b*, 6.5; Wyandotte and Sterling, 5.5; Topeka, 5; Ninnescah, Wellington, and Manhattan *a*, 4.5; Leavenworth, 4.4; Yates Center, 3.8; West Leavenworth, 3.4; Elk Falls, 3.

Maine.—Gardiner, 22.5; Orono, 22; Cornish and Belfast, 19; Solon, 18; Mayfield, 17; Bridgeton, 15.5; Fairfield, 12; Portland, 9.5; Bar Harbor, 9; Eastport, 6.6.

Massachusetts.—Rowe, 15.7; Williamstown, 13; Gilbertville, 10.5; Dudley, 9.8; Beverly Farms, 9; Amherst *a* and Concord, 8.5; Northfield, 8.2; Fitchburg, 7.8; South Hingham and Lowell, 7; Newburyport and Blue Hill Observatory, 6.8; Blue Hill, 6.3; Nantucket and Westvale, 6; Salem, 5.5; Lawrence, 5; Westborough and Taunton *a*, 4.8; Boston, 4.5; Worcester, 4.4; Quincy, 4.3; Leominster, Williamstown, Taunton *b*, and Princeton, 4; Provincetown, 3.8; Fall River, 3.5; Amherst *b*, New Bedford, and Randolph, 3.

Michigan.—Manistique, 26; Alpena, 23.2; Marquette, 15.6; Traverse City, 13.5; Escanaba, 12.4; Lansing, 10.5; Mackinaw City, 9.8; Hudson, 9.2; Thornville, 7.5; East Saginaw, 7.4; Mottville, 6.5; Detroit, 6; Port Huron, 3.9.

Minnesota.—Northfield, 20.6; Albert Lea, 19; Spring Valley, 14; Mankato, 12.6; Duluth, 11.7; Red Wing, 11.6; Preston, 10.8; Saint Paul, 10.4; Grand Forks, 9.3; Winona, 8.5; Saint Vincent, 3.8.

Montana.—Fort Assinaboine, 16.3; Fort Maginnis, 15.4; Fort Custer, 12.5; Helena, 8.1; Fort Benton, 6.8; Fort Shaw, 6; Poplar River, 3.

Missouri.—Centreville, 8.7; Pierce City, 5.

Nebraska.—Stromsburg, 42; Central City, 41; Yutan, 37.2; Genoa, 34.6; De Soto, 30.4; Marquette, 29.4; Beaver Creek, 29; Weeping Water, 26.8; Fairbury, 24; Ashland, 22; North Platte, 21.6; Fremont, 21.4; Brownville, 20.2; York, 20; Valentine, 17.8; Stockham, 17; Hay Springs, 16.5; De Witt, 13; Syracuse, 12; West Point, 10; Dawson, 7; Omaha, 3.5.

Nevada.—Carson City, 16.5; Winnemucca, 16.3; Toana, 14.5; Otego, 14.2; Carlin, 12.2; Halleck, 10; Hawthorn and Wadsworth, 8.5; Tacoma, 8; Palisade, 7.5; Reno, 7; Elko, 6; Golconda, 4.5; Humboldt, 4; Beowawe and Wells, 3.5; Brown's, 3.2; Hot Springs, 3.

New Brunswick.—Saint John, 25; Parker's Ridge, 10.

New Hampshire.—Mount Washington, 22.2; Berlin Mills, 19; Concord, 12; Littleton, 10.5; Walpole, 10.2; Manchester *a*, 10; Nashua and Manchester *b*, 8; Hanover, 6.7.

New Mexico.—Galinas Spring, 6, Santa Fé, 5; Fort Stanton, 4; Puerto de Luna, 3.6.

New York.—Auburn, 14; Buffalo, 13.1; Ithaca, 9.9; Humphrey, 9.2; Menand Station, 8.2; Albany, 8; Rochester, 6.5; Le Roy, 4.7; Mountainville and Palermo, 3.8; Cooperstown, 3.5.

Ohio.—Hiram, 8; Cleveland and Wauseon, 7.3; Garrettsville, 6; Toledo, 5.1; Ruggles and Tiffin, 5; Napoleon, 4.6; Fostoria, 4.5; North Lewisburg, 4; West Milton, 3.5.

Oregon.—Eola, 3.

Pennsylvania.—Grampian Hills, 9; Mahanoy Plane, 7; Erie, 6.8; Bloomington, 5; Dyberry and Zionsville, 4; Franklin, 3.4; Wellsborough and Quakertown, 3.

Rhode Island.—Olneyville, 4.2; Woonsocket, 4; Providence and Lonsdale, 2.8; Block Island, 3.2.

Utah.—Corinne, 21.5; Ogden, 18.2; Salt Lake City, 13.2; Blue Creek, 8; Terrace, 5.

Vermont.—Stowe, 31; Strafford, 15; Newport, 14.5; Jacksonville, 12.8; Marlborough, 11.3; Chelsea, 10.8; Dorset, 10.4; Vernon, 10; Lunenburg, 9; Windsor and Brattleborough, 7.8; Burlington, 7; Poultney, 6.8; Post Mills, 5; Townshend, 4.5.

West Virginia.—Helvetia, 12.5.

Wisconsin.—Madison, 27.1; Embarras, 21.8; Beloit, 18.5; Neillsville, 16.5; Milwaukee, 16.1; Manitowoc, 8; La Crosse and Prairie du Chien, 7.5.

Wyoming.—Fort Bridger, 13.6.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches and tenths.*]

Colorado.—Pike's Peak, 12.

Connecticut.—North Colebrook, 3.

Dakota.—Vermillion, 11; Yankton, 7.2; Fort Totten, 0.5.

Illinois.—Riley, 15; Rockford, 12; Sycamore, 10.5; Windsor and Charleston, 8; Bunker Hill and South Evanston, 6; Mattoon, 5; Bloomington, 4.5; Pekin, Beardstown, and Peoria, 4; Springfield, 2; Chicago and Anna, 1.

Indiana.—Greencastle, 2.5; Laconia, 2; La Grange, 1.5; Spiceland, 1.3; Sunman, 1; Knightstown and Indianapolis, 0.8; Jeffersonville, trace.

Iowa.—Clinton and Davenport, 10; Muscatine, 5; Monticello, 4; Keokuk, 2.7; Cresco and Des Moines, 1 to 3; Oskaloosa *a* and Oskaloosa *b*, 1; Manchester, drifts; Independence and Cedar Rapids, trace.

Kansas.—Fort Scott and Atchison, 1; Concordia, 0.5; Salina, trace.

Kentucky.—Louisville, 0.5; Frankfort, trace.

Maine.—Kent's Hill, 24; Gardiner, 22; Orono and Buckfield, 12; Eastport, 0.3.

Michigan.—Marquette, 30; Manistique, 13; Traverse City, 10; Mackinaw City, 5; Escanaba, 3.9; Alpena, 3; Thornville, 1; Grand Haven, trace.

Minnesota.—Northfield, 3; Saint Vincent, 0.5.

Missouri.—Saint Louis, 1; Pierce City, trace.

Nebraska.—Genoa, 8; Marquette, 5; Fremont, Yutan, and Fairbury, 3; Stockham, 2; Omaha, 0.5; De Soto, 0.4; Hay Springs, trace.

Pennsylvania.—Dyberry, trace.
Vermont.—Stowe, 5; Strafford, 3; Post Mills, 1.
Washington Territory.—Spokane Falls, 0.3.
Wisconsin.—Embarras, 14; Madison, 13.5; Milwaukee, 6; Neillsville, 1 to 5; La Crosse, 0.5.

HAIL.

Fall Brook, San Diego county, California: a heavy fall of hail occurred at 8 a. m. of the 18th, lasting several minutes. The stones, which were the size of peas, fell in sufficient quantity to whiten the ground and remained unmelted for half an hour. Hail showers also occurred at 8.30 and 11.30 a. m. and 2.30 p. m. of the same day.

Birmingham, Jefferson county, Alabama: a violent hail storm occurred at 3.30 p. m. of the 29th, lasting five minutes. The stones, which were of clear ice, were generally spherical in shape and of the size of chestnuts. Considerable damage was done to gardens, skylights, etc.

SLEET.

Sleet occurred in the various states and territories during the month, as follows:

Alabama.—Montgomery, 4th; Greensborough, 31st.
Connecticut.—Bethel, 19th; New Haven, 21st.
Dakota.—Fort Buford, 12th, 15th.
Georgia.—Quitman, 13th.
Idaho.—Boisé City, 16th, 26th.
Indiana.—Indianapolis, 5th, 13th; Vevay, 21st.
Iowa.—Independence, 11th; Davenport, 11th, 12th, 20th; Cedar Rapids, 14th; Oskaloosa, 28th.
Kansas.—Ottawa, 1st; Independence, 2d; El Dorado, 2d, 24th, 25th; Fort Riley, 4th; Yates Centre, 20th; Ninnescah, 28th.
Maine.—Portland, 12th, 16th, 20th, 21st, 29th, 30th; Eastport, 15th, 16th, 21st, 22d.
Massachusetts.—Princeton, 21st.
Michigan.—Grand Haven, 15th, 28th; Escanaba, 17th, 20th, 21st; Marquette, 19th.
Minnesota.—Saint Paul, 19th.
Missouri.—Lamar, 25th, 29th.
Nebraska.—Brownville, 4th; Valentine, 18th.
New Jersey.—Dover, 12th, 22d, 23d, 27th.
New York.—Le Roy, 12th; Setauket, 27th; Fort Columbus, 28th.
Ohio.—Cleveland, 12th, 21st; Columbus, 21st.
Pennsylvania.—Easton, 18th to 21st.
South Carolina.—Spartanburg, 10th.
Tennessee.—Memphis, 4th.
Texas.—Abilene and El Paso, 29th.
Vermont.—Poultney, 8th.
Virginia.—Fort Myer, 12th.
Washington Territory.—Olympia, 7th, 15th; Tatoosh Island, 15th; Walla Walla, 19th, 24th, 31st; Pysht, 24th, 25th; Fort Spokane, 31st.
Wisconsin.—La Crosse and Madison, 20th.

TEMPERATURE OF WATER.

Observations were interrupted by ice throughout the month at the following stations: Duluth, Minnesota; Escanaba, Marquette, Mackinaw City, and Alpena, Michigan; Milwaukee, Wisconsin. Observations were also interrupted by ice at Chicago, Illinois, from the 1st to 11th; Detroit, Michigan, 1st to 10th, 13th, 14th, 15th; Toledo, Ohio, 1st to 14th; Sandusky, Ohio, 1st to 20th; Cleveland, Ohio, 1st to 14th, 22d, 23d, 27th, 28th; Buffalo, New York, 1st to 23d. Observations were suspended during the month at Indianola, Texas, and at San Francisco, California, from the 22d to 31st.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for March, 1886.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
	°	°	°		°
Atlantic City, New Jersey	43.0	33.9	9.1	8.9	38.1
Alpena, Michigan*					
Augusta, Georgia	61.0	47.9	13.1	10.1	54.3
Baltimore, Maryland	45.5	33.2	12.3	10.0	41.6
Block Island, Rhode Island	38.1	28.1	10.0	8.3	34.2
Boston, Massachusetts	40.1	29.3	10.8	20.0	33.7
Buffalo, New York*	39.6	33.5	6.1	10.0	31.0
Cedar Keys, Florida	68.9	53.8	15.1	8.6	59.2
Charleston, South Carolina	59.0	45.7	10.3	38.2	53.9
Chicago, Illinois *	39.2	33.6	5.6	8.2	30.1
Chincoteague, Virginia	50.4	31.4	19.0	3.3	41.4
Cleveland, Ohio*	39.0	33.3	5.7	14.0	34.9
Detroit, Michigan *	35.4	33.0	2.4	22.6	35.6
Duluth, Minnesota *					
Eastport, Maine	36.0	31.5	4.5	16.9	28.1
Escanaba, Michigan*					
Galveston, Texas	68.0	56.2	11.8	12.8	59.0
Grand Haven, Michigan	37.4	31.1	6.3	19.0	30.4
Indianola, Texas †					
Jacksonville, Florida	69.7	55.1	14.6	18.0	59.9
Key West, Florida					
Mackinaw City, Michigan*					
Macon, Fort, North Carolina	58.0	43.0	15.0	8.3	49.3
Marquette, Michigan*					
Milwaukee, Wisconsin *					
Mobile, Alabama	64.0	51.2	12.8	17.0	56.7
New Haven, Connecticut	39.0	30.7	8.3	16.2	34.3
New London, Connecticut	37.9	32.7	5.2	12.7	35.1
New York City	40.0	31.0	9.0	18.0	36.9
Norfolk, Virginia	51.3	38.1	13.2	15.8	46.3
Pensacola, Florida	64.4	55.1	9.3	17.5	57.5
Portland, Maine	37.8	30.5	7.3	16.1	29.2
Portland, Oregon	49.8	43.0	6.8	52.6	44.8
Sandusky, Ohio*	41.4	37.9	3.5	10.0	34.9
Sandy Hook, New Jersey	38.9	28.1	10.8	9.3	36.8
San Francisco, California†	55.0	53.9	1.1	39.2	52.6
Savannah Georgia	63.1	47.1	16.0	9.7	57.2
Smithville, North Carolina	62.9	42.0	20.9	10.8	50.4
Toledo, Ohio*	42.3	32.9	9.4	13.0	34.0
Wilmington, North Carolina	58.8	45.9	12.9	12.0	52.5

* Observations interrupted by ice; see text. † Observations temporarily suspended.

WINDS.

The most frequent directions of the wind during March, 1886, are shown on chart ii by the arrows flying with the wind; they are also given in the tables of miscellaneous meteorological data. In the upper Mississippi and Missouri valleys, and on the Atlantic coast north of the thirty-fifth parallel the prevailing winds were northwesterly; in the lower lake region, Ohio Valley, south Atlantic and east Gulf states they were from southwest to northwest; in the middle and southern Rocky Mountain districts and in the west Gulf states they were variable; in the northern slope and northern plateau they were southwesterly; on the California coast they were westerly at all stations, except northwesterly at Cape Mendocino; in the north Pacific coast region they were from south and southwest, except northerly at Roseburg, Oregon.

HIGH WINDS.

[*In miles per hour.*]

Wind-velocities of fifty or more miles per hour were reported during the month, as follows:

Mount Washington, New Hampshire, 115, nw., 1st; 90, nw., 2d; 64, ne., 4th; 66, nw., 5th; 84, nw., 6th; 72, nw., 7th; 54, nw., 8th; 67, nw., 10th; 90, n., 11th; 82, nw., 12th; 83, nw., 14th; 52, nw., 15th; 60, nw., 16th; 80, nw., 18th; 86, e., 21st; 64, nw., 22d; 80, nw., 23d; 65, nw., 24th; 100, w., 25th; 101, nw., 26th; 75, nw., 27th; 78, sw., 29th; 69, w., 30th; 100, s., 31st.

Pike's Peak, Colorado, 60, nw., 7th; 74, sw., 10th; 70, w., 13th; 76, w., 14th; 54, w., 15th; 56, w., 16th; 68, w., 17th; 56, w., 18th; 52, sw., 19th; 50, n., 20th; 64, w., 24th.

Cape Mendocino, California, 70, se., 8th; 52, se., 16th; 54, nw., 18th; 62, se., 21st; 60, se., 22d; 58, se., 23d; 62, se., 31st.

Fort Buford, Dakota, 52, w., 24th.

Fort Sill, Indian Territory, 52, se., 11th.

Dodge City, Kansas, 52, s., 18th.

Fort Assinaboine, Montana, 54, w., 23d.

Sandy Hook, New Jersey, 60, nw., 1st; 60, nw., 2d; 56, nw., 23d.

New York City, 54, nw., 2d.
Fort Macon, North Carolina, 51, sw., 21st.
Chincoteague, Virginia, 51, nw., 2d.

LOCAL STORMS AND TORNADOES.

Vevay, Switzerland county, Indiana: a heavy thunderstorm, attended by a violent gale moving from south to northeast, occurred from 5.30 to 6.10 p. m. of the 20th. Houses were unroofed, the top stories of substantial brick buildings carried away, and chimneys, trees, fences, etc., prostrated within a path six hundred feet in width; heavy rain and light hail accompanied the storm. After passing over this place no other damage was done until the storm reached Bethel Church, six miles northeast of this station, where it carried away the roof and rafters of the church and deposited them two hundred feet away.

Savannah, Georgia: two tornadoes occurred in this vicinity about 4 p. m. of the 20th; one in Ware county, near Waycross, which moved from southwest to northeast, with a track about two hundred yards wide, and the other in the northern part of Chatham county. No great damage was done by either, as their tracks were through a pine wood country.

Helena, Phillips county, Arkansas: a tornado occurred about 4.30 p. m. of the 29th, doing considerable damage in this city. The direction of movement was from west to east. West of the hills, which act as a barrier to the city, it was more violent, blowing down houses and rendering some of the roads impassable by the fallen trees. The loss is estimated at about $10,000.

Grove Hill, Clarke county, Alabama: a tornado passed near this place on the 27th, doing considerable damage to timber and fencing. The storm came from the west and its track was one-fourth of a mile wide.

Smith's Station, Lee county, Alabama: a tornado passed over this section during the storm of the 29th and 30th, doing much damage to property in its track, the width of which was about one hundred yards; the storm moved from the southwest. Some small buildings were destroyed, fences blown down, and several persons slightly injured.

The following are accounts of tornadoes which occurred during March, 1886, forwarded by special tornado observers:

Belmore, Putnam county, Ohio: a tornado occurred at 8.30 p. m. of the 20th, passing from southwest to northeast; one church was badly damaged.

Williamsport, Allen county, Indiana: a severe storm, probably a tornado, occurred at 5.30 p. m of the 20th, destroying two churches, several barns, and killing a few cattle.

Several tornadoes are reported to have occurred on the afternoon of the 29th in Georgia. In Bullock county, a church was destroyed, four persons were killed and ten badly injured; at LaGrange, Troup county, several old buildings were thrown down; near Palmetto, Campbell county, one house was destroyed and three persons fatally injured.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The Mississippi River reached its highest stage during the month at all stations north of Cairo, Illinois, from the 28th to 31st. At Keokuk, Iowa, it passed the danger-line on the 30th, and at the close of the month was .3 of a foot above this point; navigation was practically resumed at all points between Keokuk, Iowa, and Saint Paul, Minnesota, from the 16th to 28th. At Cairo a gradual rise set in on the 23d, and on the 31st the water was within .9 of a foot of the danger-line, and continued rising.

The Ohio River at Pittsburg, Pennsylvania, which had been rising slowly since the 12th, reached its highest stage, 14.1 feet, on the morning of the 23d, after which the water began to recede.

The Tennessee River at Knoxville, Tennessee, was remarkably low on on 17th, the gauge showing but 1.2 feet, and on the 19th the water was two inches lower. A decided rise set in on the 28th, and at 2 p. m. of the 31st had reached a height of 29.5 feet, a rise of 18.7 feet in the preceeding twenty-four hours.

In the following table are shown the danger-points at the various river stations; the highest and lowest depths for March, 1886, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, March, 1886.

[*Expressed in feet and tenths.*]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, Louisiana	29.9	28	17.6	1, 2	13.0	4.6
Arkansas River:						
Fort Smith, Arkansas	22.0	11	9.2	29	4.7	4.5
Little Rock, Arkansas	23.0	14	10.1	28, 29	6.1	4.0
Missouri River:						
Yankton, Dakota *	24.0	18	14.1	31	10.0	4.1
Omaha, Nebraska *	18.0	29	9.4	17	8.0	1.4
Leavenworth, Kansas	20.0	26	14.9	12, 13, 14	7.6	7.3
Mississippi River:						
Saint Paul, Minnesota *	14.5	29, 31	8.2	25	6.0	2.2
La Crosse, Wisconsin *	24.0	31	7.7	22	5.8	1.9
Dubuque, Iowa	16.0					
Davenport, Iowa *	15.0	28	9.7	20	7.8	1.9
Keokuk, Iowa *	14.0	31	14.3	17	6.1	8.2
Saint Louis, Missouri	32.0	30	23.2	15, 17, 18	14.9	8.3
Cairo, Illinois	40.0	31	39.1	19, 20	20.4	18.7
Memphis, Tennessee	34.0	1	28.0	23	14.4	14.2
Vicksburg, Mississippi	41.0	6	39.0	28	24.2	14.8
New Orleans, Louisiana	13.0	9, 12	13.1	31	9.6	3.5
Ohio River:						
Pittsburg, Pennsylvania	22.0	23	14.1	11	2.9	11.2
Cincinnati, Ohio	50.0	31	40.4	14	12.3	28.1
Louisville, Kentucky	25.0	31	14.9	15	6.1	8.8
Cumberland River:						
Nashville, Tennessee	40.0	31	38.2	15	6.5	31.7
Tennessee River:						
Knoxville, Tennessee		31	29.6	19	1.1	28.5
Chattanooga, Tennessee	33.0	31	43.0	12, 20	5.0	38.0
Monongahela River:						
Pittsburg, Pennsylvania	29.0	23	14.1	11	2.9	11.2
Savannah River:						
Augusta, Georgia	32.0	31	30.8	20	7.8	23.0
Mobile River:						
Mobile, Alabama		28	18.2	2	15.6	2.6
Sacramento River:						
Red Bluff, California		10	3.6	29, 30, 31	2.7	0.9
Sacramento, California		6	19.5	31	17.5	2.0
Willamette River:						
Portland, Oregon		24	8.7	3, 4, 5	3.0	5.7
Colorado River:						
Yuma, Arizona		6	18.3	1	15.3	3.0

* Observations interrupted by ice; see text.

ICE IN RIVERS AND HARBORS.

Mississippi River.—Saint Paul, Minnesota: the ice dam below Robert street bridge broke at 2.30 p. m. of the 25th, and passed out without doing damage. Owing to the many obstructions in the river above the bridge the dam remained intact until the 31st, on which date it moved a short distance.

Red Wing, Goodhue county, Minnesota: river opened and ice ran out on 25th.

La Crosse, Wisconsin: river frozen from the 1st to 21st; river clear of ice along the Wisconsin shore, and extending one quarter of the distance across, from the 22d to 26th; heavy floating ice on the 27th; river clear of ice and navigation opened on the 28th; the steamer "Percy Swain," the first boat of the season, arrived on the 29th.

Muscatine, Muscatine county, Iowa: the ice in the river broke and ran out on the 18th; the first steamboat of the season arrived on the 29th.

Davenport, Iowa: river frozen, 1st to 18th; river open on the 19th; the steamer "Wes Rambo" arrived and departed on the 22d, opening navigation for the season.

Keokuk, Iowa: the ice dam in the river on the 4th extended from three miles north of this city to Quincy, Illinois; the ice commenced to break on the 14th, and on the 15th the channel was clear from this point to Saint Louis. The Warsaw packet "Patience" resumed her regular trips on the 16th, opening navigation for the season.

Saint Louis, Missouri: floating ice, 4th to 10th.

Missouri River.—Yankton, Dakota: the ice in the river broke and passed out during the night of the 17th, but gorged at Elk Point on the 20th.

Omaha, Nebraska: the ice in the river began to move on the 15th; river open, 17th.

Leavenworth, Kansas: floating ice in river, 1st to 6th.

Platte River.—Yutan, Saunders county, Nebraska: ice broke on the 18th; river clear of ice, 22d.

Cedar River.—Cedar Rapids, Linn county, Iowa: river clear of ice on the 22d.

Ohio River.—Pittsburg, Pennsylvania: floating ice, 1st to 8th, 11th.

Red River of the North.—Grand Forks, Grand Forks county, Dakota: the ice in the river was two feet thick and not broken at the end of the mouth.

Saint Vincent, Minnesota: river frozen throughout the month.

Lake Superior.—Duluth, Minnesota: lake frozen throughout the month.

Milwaukee River.—Milwaukee, Wisconsin: the ice in the lower portion of the river broke and moved out on the 17th, and in the upper portion on the 20th.

Lake Michigan.—Chicago, Illinois: ice broke and floated out of the harbor on the 12th. Captain Rogers, of the propeller "A. B. Taylor," which arrived from Saugatuck, Michigan, on the 20th, states that navigation is open as far as the upper part of the lake is concerned; this is the first arrival of the season.

Saint Clair River.—Port Huron, Michigan: floating ice in the river, 15th, 16th, 19th, 21st to 30th; the steamer "Mary" resumed her regular trips between this city and Saint Clair on the 16th; the steam barge "Atlantic" arrived from Detroit on the 28th, and departed for points up the lake, being the first departure north for the season; 300,000 feet of logs were torn from their moorings on Sarnia Bay by ice on the 31st, and were carried down the river.

Detroit River.—Detroit, Michigan: floating ice in river, 1st to 11th, 12th, 13th, 14th, 16th, 19th, 21st to 25th, 28th. The steamer "Riverside" arrived from Amherstburg, Province of Ontario, on the 15th, being the first arrival of the season.

Grand River.—Grand Haven, Michigan: but little ice remained in the river on the 4th. Lake Michigan was entirely free of ice at this point on the 12th, and the Milwaukee boats were making their regular daily trips.

Lansing, Ingham county, Michigan: river was clear of ice on the 19th.

Maumee River.—Toledo, Ohio: ice began moving on the 14th, and on the 19th the river was clear of ice.

Sandusky River.—Tiffin, Seneca county, Ohio: river partially filled with slush ice on the 7th, 11th.

Sandusky Bay.—Sandusky, Ohio: ice in the bay broke and began moving out on the 16th; bay entirely clear of ice on 21st; navigation resumed on 31st.

Lake Erie.—Cleveland, Ohio: the steamer "City of Detroit," from Detroit, arrived on the 25th, being the first arrival of the season.

Presque Isle Bay.—Erie, Pennsylvania: the bay was clear of ice on the 26th.

Niagara River.—Buffalo, New York: river open on the 24th.

Oswego River.—Oswego, New York: river and mouth of harbor was free of ice on the 26th.

Hudson River.—Troy, Rensselaer county, New York: the ice in the river in front of the city began to move out on the 23d, but the gorge at Pleasant Island remained firm.

Albany, New York: river frozen from the 1st to 25th; the ice broke during the morning of the 26th and slowly moved out. The steamer "Lotta" left for New Baltimore, Greene county, on the 27th, and returned on the 29th, opening navigation for the season.

Poughkeepsie, Dutchess county, New York: the steamer "John L. Hasbrouck" arrived on the 12th from New York City, opening navigation for the season.

New York City: navigation was greatly interfered with by ice on the 2d, 3d, 5th, and 6th. The river was again closed by ice on the 2d; at Tarrytown it was nearly frozen across, and entirely frozen at Peekskill. Below Tarrytown the tide broke the ice and piled it high along the shore, the channel being full of floating ice-blocks, rendering it impossible for steamers to break their way through.

Mount Hope Bay.—Fall River, Bristol county, Massachusetts: the port was entirely closed to navigation by ice from the 2d to 5th for steamers, and to the 9th for sailing vessels.

Lake Whitney.—New Haven, Connecticut: lake clear of ice on the 19th.

Sandy Hook Bay.—Sandy Hook, New Jersey: floating ice in the bay on the 3d, 4th, 5th, and 6th.

Chincoteague Bay.—Chincoteague, Virginia: bay frozen on the 2d, causing the suspension of navigation.

Chesapeake Bay.—Baltimore, Maryland: considerable ice was reported in the bay from Sandy Point to Seven-foot Knoll on the 2d.

Miscellaneous.—Mr. Wm. G. Yetter, voluntary observer at Catawissa, Columbia county, Pennsylvania, reports that the north branch of the Susquehanna River was closed by ice on morning of the 2d, but opened during the afternoon of the 3d. Navigation on the north branch of the Pennsylvania Canal was resumed on the 29th.

FLOODS.

Dakota.—Yankton: an ice gorge formed on the 20th, causing the Missouri River to overflow its banks, inundating the entire district between Sioux City and Elk Point. Hundreds of acres of farms were submerged from one to fifteen feet. The railroad bed in many places was entirely washed away, and considerable loss to live stock reported. The gorge held until the 25th.

Mandan, Morton county: an ice gorge formed in the river on the 26th, causing a rapid rise in the water, and flooding the entire lower part of the city.

Nebraska.—Meade, Saunders county: a freshet occurred in the Platte River on the 24th, breaking the ice, overflowing the banks, destroying the railroad bridge, and doing other damage.

Yutan, Saunders county: the Platte River overflowed its banks on the 17th and 18th, submerging the bottom lands above and below this place, the railroad track on both sides of the river for several miles was washed away; a few spans of the railroad bridge were also carried away.

Genoa, Platte county: the ice in the upper Loupe river commenced to break on the 16th; after the break ice-dams formed, causing the river to overflow on the 17th, flooding the old-town section of the city of Columbus. Bridges over the Loupe and Platte rivers were almost entirely destroyed, together with ten spans of the railroad bridge near the same city.

Wisconsin.—Milwaukee: the heavy rains of the 19–20th, together with melting snow and ice, caused the Menomonee and Milwaukee Rivers to overflow their banks on the 20th, doing considerable damage in the city and suburbs. The high water caused the sewers to back up, flooding a number of cellars and damaging their contents, especially among the business houses in the lower portion of the city, along the river front.

New York.—Troy, Rensselaer county: owing to the heavy rains from the 19th to 21st the Mohawk and Hudson rivers became greatly swollen, and at 10 p. m. of the 21st were within two feet of the great flood of last month. Serious land slides occurred on the Hudson River Railroad and in the southern part of the city; railroad traffic was suspended between this city and Albany.

Albany: the Hudson River rose rapidly during the morning of the 22d, and a freshet of eleven feet prevailed, overflowing the docks.

The excessive and unusual rainfall throughout the Southern States at the close of the month produced floods in all the rivers, causing the loss of many lives and an enormous destruction of property. In anticipation of these freshets the following warnings were issued by the Signal Service:

WASHINGTON CITY, *March* 30, 1886—10 a. m.

Continuous rains have fallen in the Southern States during the past few days, and will cause a rapid rise in the rivers, producing floods.

HAZEN.

At 3 p. m. the forecast was:

All rivers will generally rise in the Southern States, and freshets will occur.

HAZEN.

An effort was made to inform the public of the unusual rainfall and probable freshets, and the wisdom of these warnings was fully justified by the succeeding reports.

The following reports will serve to illustrate the destructive effect of these floods, which continued into the month of April, and they will be further described in the next REVIEW:

Virginia.—Lynchburg: incessant rains for several days caused a freshet in the James River and its tributaries; at 11.45 p. m. of the 30th the water had reached a height of twenty-four feet above low-water mark, being the highest since the disastrous flood of 1877. Great damage is reported along the banks of the river; several bridges were carried away, railroad tracks submerged, and traffic interrupted.

Variety Mills, Nelson county: disastrous floods followed the heavy rainfall of the last days of the month; the Tye and James Rivers were higher than at any time since the unprecedented flood of November 24, 1877. The Richmond and Allegheny Railroad was seriously damaged by the overflow in this county and elsewhere.

Georgia.—Augusta: a rapid rise in the Savannah River, causing it to overflow its banks, occurred on the 30th, the water reaching a height of 30.8 feet on the 31st and was still rising. Traffic was interrupted and railroads and mills compelled to suspend operations.

West Point, Troup county: the Chattahoochee River rose during the night of the 30th, flooding the town, carrying away the railroad bridge, and causing a loss of $100,000 to property.

Columbus, Muscogee county: the Chattahoochee River was higher than ever before known on the 30th. The low country farms were damaged many thousand dollars, and the river was rising at the rate of six inches an hour.

Rome, Floyd county: the flood in the Coosa River submerged this city on the 30th, causing the inhabitants to seek the hill tops for safety.

Alabama.—Montgomery: owing to the heavy rains, a rapid rise occurred in the Alabama River on the 30th, and on the 31st the river had reached the highest point ever known, covering the Union depot railroad track to the depth of eleven inches. Trains were delayed in every direction, and considerable amount of damage done.

Tuscaloosa, Tuscaloosa county: the continuous rains for the forty-eight hours ending on the 30th caused the greatest flood in the Warrior River in fifty years, and from the present outlook the destruction of property and life will be enormous. During the evening of the 30th the river marked sixty-three feet above low-water mark and was still rising. The village of Northport, opposite this place, was flooded and the inhabitants compelled to vacate; below this place hundreds of negroes were cut off without boats and compelled to take to the top of their cabins for safety. Thousands of cattle were caught in the swamps and drowned. Reports from the surrounding country state that bridges and mills have been swept away.

Greensborough, Hale county: the rain storm from 4.30 p. m. of the 28th to 4 a. m. of the 31st was unparalleled, and produced destructive freshets in all streams at the close of the month. The Warrior River, ten miles west of this place, was three feet higher than ever known before; country bridges over numerous creeks were washed away or badly damaged, and railroad traffic between Selma and Tuscaloosa interrupted for five days.

Wetumpka, Elmore county: the bridge across the Coosa River at this place was washed away on the 30th.

Prattville, Autauga county: the freshet undermined a cotton factory, which fell in, causing a loss of $85,000. Two hundred laborers were thrown out of employment.

North Carolina.—Chapel Hill, Orange county: a rapid rise occurred in the Roanoke River on the 31st, which overflowed its banks.

Kentucky.—Lexington, Fayette county: North River was eight feet higher than ever known on the 31st, and was still rising.

Tennessee.—Chattanooga: the river rose 13.5 feet during the twenty-four hours ending 2 p. m. of the 30th, and at 6.30 p. m. of the 31st had reached the height of forty-three feet, ten feet above the danger-line, and was rapidly rising.

Knoxville: the river and all tributary streams were flooded on the 31st, and considerable damage reported. The stage of water at 2 p. m. was 29.5 feet, showing a rise of 15.7 feet during the preceding twenty-four hours.

Sweetwater, Monroe county: at 1 a. m. of the 31st heavy rain was falling and no signs of abatement. The entire lower portion of the town was submerged, and nearly one hundred people rendered homeless.

Loudon, Loudon county: at 9 p. m. of the 31st the river was twenty-three feet and rising at the rate of ten inches per hour; land slides had occurred on the Loudon bluff, and families were driven from their homes on account of the high water.

Nashville: at 2 p. m. of the 31st the river had reached a height of 38.2 feet, and was rising at the rate of two inches per hour. Fears were entertained of a dangerous overflow.

HIGH TIDES.

New River Inlet, North Carolina, 17th.
Fort Macon, North Carolina, 18th, 20th.
Cedar Keys, Florida, 20th, 21st.
New Haven, Connecticut, 21st.
Eastport, Maine, 23d, 25th.

LOW TIDES.

The "New York Herald" of March 4, 1886, states:

The tides in all the bays along the south coast of Long Island have during the past few days been lower than for forty years. Large areas of oyster beds have been left uncovered by water for several hours at a time, and the oysters and clams have been frozen and killed. Many oystermen of Mecox, Shinnecock, Peconic, and Great South bays are heavy losers.

Low tides were also reported from—
Philadelphia, Pennsylvania, 1st, 2d.
New River Inlet, North Carolina, 2d, 3d.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for districts east of the Rocky Mountains during March, 1886, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 75.95 per cent. The percentages for the four elements are: Weather, 78.05; direction of the wind, 75.65; temperature, 73.46; barometer, 84.67 per cent. By geographical districts, they are: For New England, 77.02; middle Atlantic states, 77.12; south Atlantic states, 74.48; eastern Gulf states, 79.03; western Gulf states, 76.79; lower lake region, 74.04; upper lake region, 75.62; Ohio Valley and Tennessee, 76.25; upper Mississippi valley, 74.56; Missouri Valley, 74.65. There were nine omissions to predict, out of 2,865, or 0.31 per cent. Of the 2,856 predictions that have been made, one hundred and thirty-eight, or 4.83 per cent., are considered to have entirely failed; one hundred and eighty-five, or 6.48 per cent., were one-fourth verified; five hundred and twenty-seven, or 18.45 per cent., were one-half verified; five hundred and eighty-six, or 20.52 per cent., were three-fourths verified; 1,420, or 49.72 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-seven days), 82.41; Arkansas (twenty-seven days), 84.72; Baltimore, Maryland (twenty-seven days), 74.07; Washington City, 79.44; Portland, Maine, 69.35; Boston, Massachusetts (thirty days), 78.25; Albany, New York, 74.60; Pittsburg, Pennsylvania, 80.65; Erie, Pennsylvania, 69.76; Lynchburg, Virginia, 78.23; Cincinnati, Ohio, 66.13; Louisville, Kentucky, 70.97; Columbus, Ohio, 67.34; Cleveland, Ohio, 66.94; Lamar, Missouri, 71.37; Oswego, New York, 72.58; Rochester, New York, 79.44; Buffalo, New York, 75.81; Indianapolis, Indiana, 74.19; Detroit, Michigan, 78.23; Toledo, Ohio, 76.61; Sandusky, Ohio, 75.81; Cairo, Illinois, 75.81; Saint Louis, Missouri, 64.52; Saint Paul, Minnesota, 64.52; Iowa, 78.63; Milwaukee, Wisconsin, 76.21; Chicago, Illinois, 73.79; Memphis, Tennessee, 79.03; Tennessee, 70.56; Shreveport, Louisiana, 71.77; Georgia, 71.77; northern Florida, 80.24; New York City, 77.02; Philadelphia, Pennsylvania, 75.00; Colorado, 66.53.

CAUTIONARY SIGNALS.

During March, 1886, eighty-three cautionary signals were ordered. Of these, seventy-two, or 86.07 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Seventy-nine cautionary off-shore signals were ordered, of which number, sixty-five, or 82.28 per cent., were fully justified, both as to direction and velocity; seventy-eight, or 98.73 per cent., were justified as to direction; and sixty-five, or 82.28 per cent., were justified as to velocity. One hundred and sixty-two signals of all kinds were ordered, one hundred and thirty-seven, or 84.57 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, thirty-seven were changed from cautionary. Seven signals were ordered late. In seventy-four cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During March, 1886, seventy-nine cold-wave signals were ordered, of which number, fifty-nine, or 77.22 per cent., were justified.

Table of miscellaneous meteorological data for March, 1886—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths). Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes. Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.	Temperature of the air (in degrees Fahrenheit). Monthly mean.	Departure from normal.	Extremes. Max.	Date.	Mean max	Min.	Date.	Mean min.	Monthly range.	Daily ranges. Greatest.	Date.	Least.	Date.	Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Winds. Total movement.	Prevailing direction.	Maximum velocity. Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.																																			
Eastport	61	29.74	—.07	29.81	30.68	29	29.07	2	1.62	28.1	0.0	49.3	31	34.0	— 7.9	1	21.7	57.2	35.4	2	4.1	21	74.0	20.5	2.28	— 3.06	7,130	nw.	44	e.	21	14	11	16	4
Portland	99	29.75	—.05	29.86	30.64	29	29.21	22	1.42	29.2	— 3.1	49.1	27	35.8	— 3.8	1	22.9	52.9	26.4	11	3.9	21	74.3	21.6	3.26	+ 0.12	6,553	nw.	32	ne.	21	17	12	14	5
Mount Washington	6,279	23.35	...	29.87	30.52	29	29.11	1	1.41	11.3	+ 1.4	44.0	31	17.4	—37.2	1	3.4	51.2	47.2	2	5.4	31	*	*12.0	3.11	— 3.23	†	nw.	115	nw.	1	21	8	13	10
Boston	125	29.74	—.06	29.87	30.58	29	29.24	13	1.34	33.7	— 0.1	64.3	31	40.5	— 1.2	1	26.2	65.5	27.1	31	3.9	30	69.6	24.1	3.20	— 1.51	10,628	nw.	41	e.	21	17	9	15	7
Block Island	27	29.86	...	29.88	30.51	29	29.26	13	1.25	34.2	— 0.5	56.0	31	40.6	5.8	2	28.4	50.2	19.3	5	4.2	15	79.4	28.3	5.42	+ 1.39	12,044	n.	44	nw.	1	12	7	10	8
Narragansett Pier	...	...	...	...	...	...	...	...	...	34.6	...	55.0	26	42.7	4.0	2	27.1	51.0	...	...	...	...	...	...	5.14	+ 1.00	...	...	...	...	...	13	...	...	...
New Haven	107	29.79	...	29.90	30.52	29	29.30	13	1.22	34.4	— 0.4	58.6	16	42.0	1.4	1	27.2	57.2	28.1	16	6.9	20	71.6	25.5	3.20	— 1.69	7,247	nw.	32	nw.	2	13	11	12	8
New London	47	29.87	—.05	29.91	30.55	29	29.30	13	1.25	35.1	0.0	55.6	16	41.9	4.5	2	28.2	51.1	21.5	16	5.6	21	74.8	27.5	4.64	— 0.19	5,165	nw.	32	s.	31	15	13	15	3
Mid. Atlantic States.																																			
Albany	83	29.85	—.05	29.94	30.51	28	29.33	22	1.18	32.6	+ 0.5	67.0	31	40.2	— 3.5	1	25.6	70.5	24.9	25	6.3	19	71.3	24.0	2.73	— 0.02	5,640	nw.	34	s.	31	16	15	13	3
New York City	164	29.75	—.06	29.92	30.48	29	29.30	13	1.18	36.9	+ 0.5	60.1	31	45.2	7.4	1	30.2	52.7	24.7	25	7.8	20	72.6	28.2	3.54	— 0.36	10,767	nw.	54	nw.	2	11	8	13	10
Philadelphia	117	29.82	—.06	29.94	30.46	28	29.30	21	1.17	40.0	+ 0.9	67.2	31	48.4	8.1	2	31.9	59.1	28.1	15	4.4	29	68.3	29.3	3.17	— 0.02	8,969	nw.	36	nw.	3	13	8	15	8
Atlantic City	13	29.91	—.06	29.91	30.43	28	29.24	21	1.19	38.1	+ 0.2	67.5	16	45.5	10.6	2	30.8	56.9	28.9	16	6.1	27	77.7	31.0	3.40	— 0.46	7,930	nw.	31	ne.	27	10	4	10	11
Sandy Hook	28	29.90	—.06	29.92	30.52	28	29.32	14	1.20	36.8	0.0	60.1	31	44.4	9.1	2	31.0	51.0	23.1	16	2.4	29	77.6	30.0	5.27	+ 0.27	14,608	nw.	60	nw.	1	15	6	14	11
Cape Henlopen	...	...	...	...	...	...	...	...	...	42.0	...	54.0	17	46.1	24.8	3	38.0	29.2	...	...	...	...	...	...	2.43	— 1.64	...	...	...	...	...	12	...	...	...
Baltimore	45	29.92	—.06	29.96	30.45	28	29.30	21	1.16	41.6	— 0.3	70.6	15	49.6	14.6	2	34.8	56.0	33.2	15	4.4	29	63.9	28.9	4.85	+ 0.91	5,847	nw.	25	nw.	21	12	9	14	8
Ocean City	...	...	...	...	...	...	...	...	...	41.1	...	68.8	16	47.7	19.7	1	34.6	49.1	...	...	...	...	...	...	1.37	— 1.23	...	...	...	...	...	9	...	...	...
Washington City	106	29.86	—.06	29.96	30.44	28	29.27	21	1.17	42.0	+ 0.5	68.9	16	50.7	13.2	2	34.3	55.7	28.1	25	5.4	29	70.8	32.0	6.41	+ 2.32	6,299	nw.	30	nw.	2	10	8	10	11
Cape Henry	16	29.97	—.03	29.97	30.37	28	29.34	21	1.03	44.6	— 1.8	78.2	25	52.8	20.8	2	37.7	57.4	38.1	25	5.6	29	73.5	35.5	1.75	— 4.13	11,209	nw.	48	nw.	2	9	5	12	16
Chincoteague	8	29.96	—.04	29.94	30.40	28	29.31	21	1.08	41.4	+ 1.1	69.4	16	48.5	16.4	2	34.9	53.0	24.4	16	4.5	28	74.2	33.2	2.39	— 1.62	11,570	nw.	51	nw.	2	11	5	15	11
Lynchburg	652	29.28	—.03	29.98	30.15	25	29.40	21	1.06	45.6	+ 0.2	77.8	25	55.0	22.9	5	36.7	54.9	34.6	18	4.3	27	68.9	35.0	5.79	+ 1.94	4,121	nw.	23	nw.	23	11	9	15	7
Norfolk	30	29.96	—.02	29.98	30.40	28	29.35	21	1.05	40.3	— 1.4	76.8	25	49.8	21.0	2	33.7	55.8	35.9	25	5.9	1	68.4	35.7	2.36	— 2.22	6,125	n.	35	s.	31	8	6	13	12
South Atlantic States.																																			
Charlotte	808	29.15	—.02	30.00	30.30	24	29.48	20	0.82	48.5	— 1.8	76.0	25	58.8	24.4	11	38.8	51.6	33.9	24	6.4	29	65.5	35.5	6.39	+ 1.12	5,126	sw.	28	sw.	31	11	9	13	9
Fort Macon	11	30.01	—.01	29.99	30.29	28	29.42	13	0.87	49.3	— 0.8	64.4	30	55.1	29.5	3	43.2	34.9	21.6	24	4.1	27	85.7	45.0	4.04	— 0.74	11,807	sw.	51	sw.	21	11	7	11	13
Hatteras	12	30.00	—.01	29.99	30.30	28	29.39	13	0.80	48.6	— 0.3	68.2	30	55.3	29.0	2	43.0	39.2	23.0	8	5.7	1	77.3	41.3	4.15	— 3.32	11,195	sw.	39	n.	10	9	7	10	14
Kitty Hawk	9	30.00	—.02	29.99	30.37	28	29.38	13	0.99	46.6	— 1.0	73.0	19	54.9	27.3	3	39.6	45.7	29.7	25	5.7	7	73.3	37.5	4.90	— 1.15	12,367	sw.	48	s.	31	9	7	10	14
New River Inlet	...	...	...	...	...	...	...	...	...	50.1	...	67.5	19	58.2	27.2	2	42.1	40.3	...	...	...	...	...	...	3.53	...	...	...	...	...	...	10	...	...	...
Smithville	34	29.98	—.02	29.99	30.30	24	29.47	13	0.83	50.4	— 3.1	69.0	30	56.9	27.2	3	43.1	41.8	25.5	24	5.4	20	80.1	44.1	5.40	+ 1.50	8,408	sw.	42	s.	31	11	7	11	13
Wash Woods ‡	...	...	...	...	...	...	...	...	...	42.9	...	70.0	19	51.0	13.0	4	34.9	57.0	...	...	...	...	...	...	2.64	...	...	...	...	...	...	12	...	...	...
Wilmington	52	29.97	—.01	30.00	30.30	24	29.45	13	0.85	52.5	— 1.9	78.1	25	62.6	28.8	1	42.6	49.3	36.2	25	8.9	27	71.6	42.2	5.60	+ 1.30	5,871	sw.	30	w.	12	11	5	14	12
Charleston	52	30.00	.00	30.02	30.36	24	29.56	13	0.80	53.9	— 3.6	75.9	25	61.7	30.5	11	46.4	45.4	24.4	25	7.7	4	76.6	45.7	2.60	— 1.08	5,556	sw.	26	s.	31	11	9	16	6
Augusta	183	29.86	—.03	30.02	30.34	24	29.56	20	0.78	54.2	— 1.6	82.0	30	65.4	25.6	11	43.9	56.4	37.5	24	8.0	20	66.6	41.4	7.42	+ 1.94	3,776	w.	24	sw.	31	8	7	14	10
Savannah	87	29.97	—.01	30.03	30.35	24	29.59	13	0.76	57.2	— 2.1	77.0	30	64.0	33.0	11	50.0	44.0	21.0	12	6.0	10	75.9	48.6	3.16	— 0.89	6,370	sw.	32	s.	31	14	8	16	7
Jacksonville	43	30.00	—.02	30.03	30.37	25	29.65	13	0.73	59.9	— 2.7	83.6	30	67.2	37.0	11	53.3	46.6	23.2	24	3.8	5	78.2	52.3	6.74	+ 3.47	5,213	nw.	34	w.	31	19	12	16	3
Florida Peninsula.																																			
Cedar Keys	22	30.00	—.08	29.98	30.34	25	29.63	12	0.71	59.2	— 4.3	76.8	29	65.5	35.9	11	51.4	40.9	25.1	11	4.7	4	85.5	54.6	12.14	+ 8.87	7,288	w.	33	w.	13	16	13	12	6
Key West	20	30.03	—.05	30.00	30.33	25	29.76	13	0.57	71.0	— 2.5	82.0	15	76.0	53.0	11	66.7	29.0	16.7	13	4.7	7	77.1	63.1	1.30	+ 0.63	8,429	se.	35	n.	13	6	4	12	13
Sanford	25	30.04	...	30.03	30.40	25	29.64	13	0.76	62.2	— 3.0	86.0	29	70.9	42.4	11	54.7	43.6	27.1	25	6.3	5	75.8	53.4	8.17	+ 5.82	4,980	n.	23	n.	10	17	11	15	5
Eastern Gulf States.																																			
Atlanta	1,129	28.85	—.03	30.03	30.31	25	29.54	20	0.77	50.1	— 2.6	73.0	25	59.2	27.0	11	42.6	46.0	27.5	14	5.5	20	63.8	36.6	11.16	+ 4.41	8,535	nw.	33	w.	21	11	5	19	7
Pensacola	30	30.02	—.06	30.00	30.32	25	29.59	12	0.73	57.5	— 3.1	73.8	23	64.8	37.7	11	51.6	36.1	26.1	23	5.3	13	77.4	49.7	13.37	+ 8.97	5,556	s.	28	s.	30	18	11	11	9
Mobile	35	30.02	—.03	30.02	30.32	25	29.62	20	0.70	56.7	— 3.0	75.0	17	64.5	34.0	11	49.8	41.0	28.1	14	6.6	28	78.3	48.7	14.02	+ 6.84	6,500	n.	27	s.	27	20	11	10	10
Montgomery	219	29.80	—.05	30.00	30.31	25	29.55	20	0.75	55.7	— 1.8	77.2	19	64.8	29.9	11	47.2	47.3	32.9	14	7.4	4	69.9	44.7	6.86	+ 0.39	4,667	w.	25	sw.	27	10	11	13	7
Vicksburg	209	29.82	—.04	30.02	30.34	10	29.60	20	0.74	55.0	— 3.2	83.0	18	65.7	28.9	10	47.2	54.1	27.2	15	9.9	2	67.9	43.2	6.07	— 0.52	4,304	sw.	28	w.	20	14	12	12	7
New Orleans	52	29.98	—.04	30.00	30.29	24	29.65	20	0.64	58.6	— 4.2	80.8	29	66.1	40.1	31	52.3	40.7	25.0	23	5.1	8	76.4	49.8	8.41	+ 2.41	6,118	se.	23	ne.	4	13	12	12	7
Western Gulf States.																																			
Shreveport	227	29.79	—.04	30.00	30.34	10	29.58	19	0.76	54.1	— 4.5	83.0	17	64.6	29.4	10	46.5	53.6	33.2	23	7.0	3	72.1	43.8	6.32	+ 1.53	5,875	s.	28	w.	20	14	14	6	11
Fort Smith	470	29.51	—.06	30.00	30.34	10	29.53	19	0.82	47.5	— 2.2	82.0	24	58.4	25.2	10	39.0	56.8	40.0	23	5.3	30	69.4	30.1	3.02	+ 1.30	5,682	e.	24	nw.	20	14	12	12	7
Little Rock	299	29.69	—.04	29.98	30.34	10	29.41	20	0.93	48.7	— 4.9	79.0	18	58.5	23.0	10	40.6	56.0	30.9	23	5.7	1	72.9	38.8	3.45	— 1.38	5,787	nw.	25	w.	20	16	13	9	9
Galveston	40	30.00	—.02	30.00	30.32	22	29.59	19	0.73	59.0	— 4.6	70.6	23	63.6	37.8	30	53.6	32.8	25.4	29	2.8	2	80.4	52.1	3.19	+ 0.05	8,956	e.	36	se.	20	9	9	15	7
Indianola	26	29.98	—.04	29.97	30.32	22	29.56	19	0.76	60.9	— 3.8	79.0	27	67.3	39.9	30	55.2	39.1	23.9	31	3.5	3	82.4	54.8	3.16	+ 0.61	11,491	e.	44	e.	2	12	12	14	5
Palestine	533	29.48	—.05	30.02	30.31	10	29.55	19	0.76	55.0	— 4.2	80.2	17	65.8	27.3	10	46.8	52.9	28.8	23	6.2	3	71.2	44.6	4.62	+ 1.22	7,493	s.	32	nw.	20	11	11	10	10
San Antonio	781	29.18	—.03	29.97	30.25	22	29.62	19	0.63	59.2	— 4.4	81.8	27	70.0	34.8	30	48.7	47.0	36.4	31	5.7	3	68.6	47.1	2.39	0.00	7,267	n.	30	n.	28	10	18	5	8
Rio Grande Valley.																																			
Brownsville	57	29.93	—.03	29.94	30.30	22	29.60	19	0.70	66.1	— 2.6	82.9	27	74.8	43.3	30	58.7	39.6	31.4	31	6.9	2	82.7	59.9	1.15	— 0.10	6,574	s.	31	s.	25	11	14	11	6
Rio Grande City	230	29.78	—.06	29.93	30.26	22	29.57	19	0.69	68.5	— 1.5	89.3	20	79.4	46.0	31	60.1	43.3	37.6	31	4.9	4	68.0	56.0	1.51	+ 0.47	4,596	se.	20	se.	24	6	11	11	9
Ohio Val. & Tenn.																																			
Chattanooga	783	29.21	—.02	30.03	30.33	2	29.45	20	0.88	49.3	— 1.7	75.6	17	58.8	25.0	11	41.3	50.6	35.7	24	3.9	30	65.5	36.4	12.77	+ 6.51	5,876	sw.	30	w.	21	10	11	14	6
Knoxville	980	28.98	—.03	30.02	30.34	2	29.44	20	0.90	47.6	+ 0.1	75.8	17	57.2	23.3	11	39.4	52.5	37.5	24	2.2	30	66.5	35.4	11.15	+ 5.41	5,620	w.	38	w.	20	14	12	14	5
Memphis	321	29.68	—.03	30.00	30.38	2	29.43	20	0.95	48.9	— 2.9	81.0	18	56.8	20.7	10	42.4	54.3	27.4	24	6.1	27	64.8	35.8	3.00	— 2.96	5,969	w.	32	nw.	9	11	11	11	9
Nashville	549	29.42	—.05	30.00	30.40	2	29.34	20	1.06	47.1	— 2.1	77.9	18	56.1	21.6	11	38.8	56.3	44.0	24	4.9	31	65.3	34.5	4.76	— 0.49	6,221	s.	36	w.	20	10	11	16	4
Louisville	551	29.41	—.04	29.99	30.45	2	29.29	20	1.16	43.9	— 0.7	77.2	18	52.7	22.5	3	35.3	54.7	35.0	18	4.6	27	65.4	31.8	3.42	— 0.95	6,587	sw.	31	w.	22	12	13	8	10
Greencastle	897	29.01	...	29.98	30.46	2	29.24	20	1.22	39.9	...	75.0	19	48.5	15.7	3	32.1	59.3	32.2	14	6.3	12	72.4	30.9	3.40	...	6,429	sw.	32	s.	20	16	11	13	7
Indianapolis	766	29.14	—.05	29.98	30.47	2	29.22	20	1.26	39.4	— 0.5	75.0	19	47.9	15.6	3	31.0	59.4	37.6	14	7.4	13	70.5	29.4	2.85	— 1.07	5,177	nw.	22	nw.	22	16	12	12	7
Cincinnati	628	29.31	—.05	29.99	30.45	2	29.25	20	1.20	41.5	— 1.5	75.1	19	51.7	17.3	3	34.1	57.8	33.4	24	6.1	13	67.5	30.3	2.27	— 1.33	7,187	sw.	30	sw.	12	13	10	14	7
Columbus	805	29.10	—.05	29.99	30.39	2	29.29	20	1.10	38.6	+ 0.5	73.3	19	47.7	10.2	1	30.2	63.1	36.3	14	5.5	8	75.9	31.5	3.90	+ 0.72	7,048	sw.	32	w.	22	16	10	19	2
Pittsburg	766	29.12	—.06	29.96	30.33	25	29.28	20	1.04	40.4	+ 2.4	76.6	19	50.4	11.4	2	32.4	65.2	32.4	15	6.2	13	78.9	33.9	2.85	— 0.11	5,613	nw.	22	w.	31	13	10	17	4
Lower lake region.																																			
Buffalo	690	29.18	—.05	29.96	30.45	28	29.22	21	1.23	31.0	+ 1.1	68.5	31	38.3	0.7	1	25.8	67.8	32.1	31	5.0	5	82.9	26.4	4.23	+ 1.35	8,640	sw.	36	sw.	31	18	17	9	5
Oswego	335	29.55	—.07	29.93	30.47	28	29.30	21	1.17	30.0	— 1.1	68.0	31	36.8	— 3.9	1	23.9	71.9	27.3	25	4.7	19	78.4	23.9	3.73	+ 0.67	9,130	nw.	40	se.	21	12	18	9	4
Rochester	621	29.25	—.05	29.95	30.50	28	29.26	21	1.24	31.5	+ 1.5	66.9	31	39.0	1.0	1	25.3	65.9	27.3	31	7.2	6	81.7	26.3	2.85	— 0.39	9,100	w.	40	nw.	23	18	19	8	4
Erie	681	29.30	—.05	29.96	30.42	28	29.23	21	1.19	31.7	— 1.2	68.0	31	41.9	— 1.2	1	24.3	69.2	37.0	15	8.4	4	80.9	25.9	3.03	— 0.05	7,333	nw.	33	s.	29	15	16	9	6
Cleveland	690	29.19	—.07	29.96	30.42	1	29.20	20	1.22	34.9	+ 1.5	73.8	19	43.4	7.4	1	27.7	66.4	37.3	19	5.5	13	79.1	28.0	2.00	— 0.92	7,535	w.	30	sw.	21	14	9	10	6
Sandusky	639	29.27	—.05	29.98	30.47	1	29.24	20	1.24	34.9	— 0.6	70.0	19	42.7	6.9	1	27.5	69.1	42.6	19	5.6	22	76.2	27.6	2.38	— 0.30	10,064	sw.	40	nw.	22	11	9	16	6
Toledo	651	29.25	—.05	29.97	30.48	1	29.17	20	1.31	34.0	— 1.4	67.5	19	42.7	7.8	1	26.8	59.7	36.2	15	5.6	22	76.0	26.6	2.28	+ 0.13	7,331	sw.	29	ne.	28	12	10	13	8
Detroit	661	29.23	—.05	29.97	30.48	1	29.15	20	1.33	35.6	+ 3.0	61.0	15	43.3	5.9	1	28.7	55.1	33.2	15	4.6	14	77.0	28.8	1.70	— 0.98	7,660	e.	27	s.	11	15	12	11	8
Upper lake region.																																			
Alpena	609	29.27	—.05	29.97	30.52	28	29.17	21	1.36	25.5	+ 2.1	48.2	25	32.9	— 5.3	1	18.6	53.5	34.9	10	2.0	20	83.3	21.1	5.56	+ 3.59	7,374	w.	26	se.	24	15	15	10	6
Escanaba	608	29.30	—.03	30.01	30.64	1	29.23	31	1.41	24.4	+ 2.6	46.7	25	32.2	— 7.0	1	15.8	53.7	31.7	5	2.7	18	78.8	18.7	3.15	+ 1.40	6,660	n.	29	n.	21	16	15	8	8
Grand Haven	620	29.24	—.08	29.94	30.51	1	29.08	20	1.42	30.4	— 0.3	61.9	19	37.0	5.4	1	24.7	56.5	31.6	24	4.4	11	79.8	24.7	3.04	+ 0.54	7,316	nw.	36	nw.	21	16	14	8	9
Mackinaw City	605	29.28	—.07	29.98	30.59	1	29.20	31	1.39	26.5	...	45.0	24	33.2	— 5.2	1	17.0	50.2	28.5	24	6.4	21	71.8	18.5	1.97	+ 0.66	8,102	e.	36	sw.	25	15	12	12	7
Marquette	672	29.23	—.05	30.01	30.63	1	29.30	31	1.33	24.1	+ 0.8	52.3	16	33.6	— 3.0	14	17.2	55.3	32.7	14	4.4	18	76.3	16.9	2.19	— 0.79	6,332	nw.	35	w.	25	13	12	10	9
Port Huron	633	29.24	—.06	29.95	30.48	1	29.16	21	1.32	30.4	+ 1.9	52.8	19	37.4	1.9	1	24.4	50.9	23.3	24	6.0	12	81.0	25.2	2.82	— 0.75	7,902	ne.	34	w.	26	15	10	14	7
Chicago	661	29.24	—.05	29.97	30.53	2	29.09	20	1.44	36.1	+ 1.3	69.9	19	44.2	15.3	3	30.1	54.6	31.8	19	6.0	3	78.0	29.7	1.79	— 1.01	6,854	nw.	20	sw.	8	9	13	11	7
Milwaukee	697	29.19	—.06	29.97	30.55	2	29.10	20	1.44	30.7	+ 0.5	58.8	24	30.5	8.8	2	25.6	50.0	29.8	24	2.0	31	80.8	25.3	3.42	+ 0.69	9,412	n.	37	n.	20	17	12	11	8
Duluth	672	29.28	—.02	30.06	30.67	1	29.51	31	1.16	23.9	— 0.1	54.4	24	34.9	— 5.0	2	14.8	59.4	36.1	31	5.3	18	72.2	15.7	1.07	— 0.52	5,311	ne.	36	se.	25	9	8	11	12
Extreme northwest.																																			
Moorhead	923	29.00	—.04	30.08	30.59	27	29.57	13	1.02	23.9	+ 6.0	58.6	23	33.3	— 6.1	9	14.6	64.7	35.6	10	7.6	19	81.4	18.7	0.14	— 0.90	9,454	n.	38	n.	12	6	11	15	5
Saint Vincent	804	29.15	—.05	30.11	30.66	27	29.55	24	1.11	17.7	+ 4.5	44.1	23	28.4	—12.6	9	6.8	56.7	35.0	4	8.4	14	84.8	13.9	0.29	— 0.25	7,627	nw.	39	w.	24	7	10	12	9
Bismarck	1,694	28.17	—.02	30.09	30.58	27	29.49	13	1.09	24.2	+ 2.2	61.1	23	35.6	—18.1	9	14.9	79.2	39.7	9	8.5	3	83.8	19.7	0.94	— 0.12	5,016	n.	37	nw.	12	10	11	11	9
Fort Buford	1,930	27.92	—.05	30.09	30.59	27	29.53	13	1.06	26.2	+ 3.0	69.1	23	37.3	—10.5	2	15.9	79.6	42.8	9	7.3	4	79.1	20.0	0.31	— 0.14	6,881	w.	52	w	24	11	11	16	4
Fort Totten	1,490	28.38	...	30.10	30.62	27	29.54	13	1.07	17.5	...	44.0	23	29.3	—15.6	9	6.5	59.6	39.5	10	7.4	1	81.0	12.7	0.72	...	...	nw.	40	sw.	15	10	9	12	10
Fort Yates	...	...	...	...	...	...	...	...	...	27.8	...	67.5	23	38.2	—15.2	9	17.5	82.7	...	...	...	...	...	...	1.09	— 0.61	...	...	...	...	...	11	...	...	...

Table of miscellaneous meteorological data for March, 1886—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.	Temperature: Monthly mean.	Departure from normal.	Extremes: Max.	Date.	Mean max	Min.	Date.	Mean min.	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Winds: Total movement.	Prevailing direction.	Maximum velocity: Miles p. hr.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Upper Miss. Valley.																																			
Saint Paul	830	29.08	—.03	30.02	30.62	2	29.48	31	1.14	27.5	— 0.9	58.0	24	35.8	— 9.8	2	19.2	67.8	33.3	2	6.7	28	76.3	20.3	1.09	— 0.46	4,382	nw.	36	w.	25	12	7	17	7
La Crosse	725	29.18	—.04	29.98	30.60	2	29.35	20	1.26	31.0	— 0.3	54.3	24	39.1	— 0.3	2	23.4	54.6	31.5	10	8.0	30	73.4	23.4	1.36	— 0.34	6,317	n.	42	n.	21	15	11	10	10
Davenport	615	29.30	—.06	29.98	30.59	2	29.25	20	1.35	33.0	— 2.2	68.2	19	41.1	4.0	3	25.6	64.2	26.5	24	4.0	29	73.6	25.1	3.08	+ 0.88	6,331	nw.	27	s.	17	12	12	10	9
Des Moines	849	29.07	—.06	30.01	30.58	2	29.48	20	1.10	34.9	— 0.1	69.9	17	43.5	8.5	9	27.8	61.4	28.9	17	4.0	28	77.5	28.3	1.41	+ 0.08	3,340	n.	22	n.	21	12	15	12	4
Dubuque	665																																		
Keokuk	618	29.30	—.06	29.98	30.56	2	29.34	20	1.22	36.5	— 1.2	76.2	18	45.8	12.1	3	29.0	64.1	34.1	24	5.5	7	75.7	28.8	2.25	+ 0.03	7,091	nw.	28	sw.	14	11	10	11	10
Cairo	359	29.63	—.04	30.00	30.46	2	29.36	20	1.10	44.7	— 2.5	78.7	24	52.0	22.6	10	37.5	56.1	34.9	24	3.6	7	65.4	32.0	2.84	— 1.13	8,457	n.	44	w.	20	11	14	11	6
Springfield	644	29.28	—.07	29.96	30.52	2	29.29	20	1.22	41.3	+ 1.9	77.0	18	50.8	18.0	3	33.0	59.0	30.8	14	6.0	31	69.7	31.9	2.45	— 0.38	8,170	s.	36	se.	28	12	11	13	7
Saint Louis	571	29.37	—.06	29.99	30.51	2	29.37	20	1.14	44.5	+ 1.5	81.2	18	53.5	23.0	10	36.8	58.2	37.6	25	6.0	7	68.8	33.9	3.04	+ 0.18	9,991	s.	37	w.	20	12	13	11	7
Missouri Valley.																																			
Lamar	1,028	28.91		30.03	30.42	2	29.53	11	0.88	42.6		81.0	18	53.2	16.6	9	33.5	64.4	36.2	13	7.4	4	68.6	31.0	1.94		10,167	nw.	40	s.	14	13	14	10	7
Leavenworth	842	29.10	—.05	30.02	30.50	2	29.53	19	0.97	39.2	— 1.6	80.3	18	48.9	8.8	9	30.9	71.5	38.3	18	3.2	5	71.4	30.3	1.35	— 0.98	6,431	nw.	27	nw.	21	10	11	11	9
Omaha	1,113	28.83	—.04	30.05	30.54	2	29.51	14	1.0.	31.9	— 3.8	63.6	24	43.2	— 1.4	9	24.7	65.0	33.6	13	7.0	5	80.4	26.0	1.31	— 0.19	6,439	nw.	36	n.	20	7	11	12	8
Valentine	2,603	27.26		30.06	30.39	27	29.44	13	0.95	26.7		74.4	23	38.5	— 8.5	9	17.8	82.9	43.3	30	5.5	3	69.2	17.0	0.53		10,058	n.	44	nw.	12	7	9	16	6
Huron	1,307	28.60	—.05	30.08	30.50	27	29.51	13	0.99	26.6	— 1.7	65.2	23	36.5	— 6.0	9	18.4	71.2	42.6	31	6.1	19	82.1	21.7	0.62	— 0.10	7,706	nw.	44	nw.	12	9	11	16	4
Yankton	1,228	28.68	—.05	30.06	30.49	2	29.49	13	1.00	28.1	— 2.0	58.8	23	36.5	— 6.1	9	20.7	64.9	33.4	31	5.0	3	80.3	22.3	3.38	+ 2.26	6,613	nw.	38	nw.	25	10	12	12	9
Northern slope.																																			
Fort Assinaboine	2,720	27.08	—.07	30.11	30.56	26	29.61	13	0.95	28.7	— 2.1	64.6	30	39.1	—19.1	1	16.8	83.7	40.2	19	9.4	24	62.5	17.4	0.85	+ 0.21	7,786	sw.	54	w.	23	5	6	16	9
Fort Benton	2,681	27.14		30.12	30.61	26	29.57	13	1.04	30.5	— 0.5	68.7	30	44.5	—16.8	1	19.1	85.5	40.5	7	10.9	10	66.2	20.2	0.70	— 0.07	1,749	sw.	31	sw.	23	6	9	13	9
Fort Custer	3,040	26.78	—.03	30.11	30.47	26	29.49	13	0.98	31.3	— 2.0	70.8	23	41.5	— 3.8	2	21.7	74.6	35.0	22	5.5	3	73.8	22.7	0.36	— 0.12	5,628	sw.	35	nw.	24	13	9	17	5
Fort Maginnis	4,340	25.43		30.03	30.39	26	29.48	13	0.92	29.1	— 2.2	58.0	23	38.7	— 2.7	1	20.7	60.7	35.3	29	7.1	6	65.0	18.3	2.25	+ 1.34	6,913	w.	43	w.	15	17	12	13	6
Fort Shaw	3,550	26.26		30.07	30.53	26	29.54	13	1.00	31.8	— 2.1	68.9	30	45.0	—17.9	1	20.7	86.8	37.0	5	14.6	6	64.3	20.8	0.55	+ 0.03	5,076	sw.	48	nw.	26	7	2	19	10
Helena	4,069	25.76	—.06	30.08	30.43	26	29.59	13	0.84	29.1	— 5.8	62.5	22	38.6	—10.0	1	20.6	72.5	28.2	2	7.8	25	65.9	18.7	1.00	+ 0.62	5,767	sw.	36	w.	13	14	6	15	10
Poplar River	2,030	27.83		30.14	30.65	27	29.58	13	1.08	26.9		69.9	23	38.6	—11.6	2	14.8	81.5	53.9	30	8.5	13	79.5	20.8	0.20	— 0.34	5,657	sw.	42	w.	24	9	9	16	6
Deadwood‡	4,600	25.27	—.03	30.11	30.38	27	29.59	13	0.78	29.5	— 2.3	60.1	23	37.1	5.9	27	21.6	54.2	28.7	9	3.6	4	75.5	22.4	2.12	+ 0.15	2,367	ne.	26	sw.	16	16	8	13	9
Cheyenne	6,105	23.88		30.07	30.33	21	29.68	13	0.66	29.6	— 3.7	66.1	23	41.7	—15.9	28	19.2	82.0	36.0	9	9.4	8	70.2	19.8	1.36	+ 0.80	9,425	nw.	56	w.	13	8	5	16	10
North Platte	2,841	27.02	—.04	30.06	30.37	25	29.57	13	0.80	30.5	— 5.2	73.0	23	42.3	— 8.0	29	20.8	81.0	41.0	23	5.0	3	76.4	23.5	0.63	+ 0. 1	6,271	nw.	36	se.	10	7	7	16	8
Fort Laramie										32.9		66.3	23	45.2	—12.0	29	20.6	78.3							1.20							4			
Middle slope.																																			
Denver	5,294	24.64	—.04	30.07	30.35	25	29.58	10	0.77	33.5	— 6.2	68.0	23	46.3	—10.7	28	22.6	78.7	35.6	15	10.7	2	65.2	20.2	2.36	+ 1.48	5,983	s.	43	n.	11	11	4	19	8
Pike's Peak	14,134	17.47		30.05	30.46	22	29.65	11	0.81	4.0	— 3.7	26.6	24	10.9	—16.1	23	— 2.1	42.7	21.2	30	7.2	18	91.4	2.0	4.72	+ 2.83	20,153	w.	76	w.	14	15	3	14	14
West Las Animas	3,899	25.95	—.05	30.00	30.30	21	29.58	18	0.72	38.7	— 2.2	80.6	23	54.9	1.8	28	25.2	78.8	53.8	23	11.5	25	62.6	24.3	0.33	— 0.12	7,516	o.	40	n.	19	8	5	15	11
Concordia	1,384	28.50		30.01	30.40	2	29.50	14	0.91	35.0		70.0	22	45.1	6.2	9	26.2	63.8	40.9	22	2.5	4	80.9	28.7	2.56		7,551	n.	34	s.	17	9	8	13	10
Dodge City	2,517	27.35	—.03	30.04	30.35	9	29.54	11	0.82	39.0	— 3.0	75.5	18	52.3	8.8	30	28.8	66.7	39.2	31	3.2	2	78.7	31.5	1.50	+ 0.69	9,689	nw.	52	s.	18	10	6	13	12
Fort Reno										48.7		87.8	24	62.5	16.9	30	34.9	70.9							0.98	— 0.83						13			
Fort Supply										45.5		82.4	17	58.7	12.0	30	32.4	70.4							0.51	— 0.57						10			
Fort Elliott	2,650	27.18	—.01	29.99	30.26	21	29.55	11	0.70	44.2	— 1.4	83.7	24	57.6	14.0	30	33.7	97.7	41.3	13	4.0	2	66.6	30.6	1.49	+ 0.96	11,324	nw.	48	se.	10	8	4	13	14
Southern slope.																																			
Fort Sill	1,200	28.74	—.06	30.00	30.32	9	29.55	19	0.78	48.7	— 3.4	88.0	24	62.8	23.3	29	37.6	64.7	43.2	24	6.8	2	60.2	32.8	1.46	+ 0.11	10,356	n.	52	se.	11	9	5	9	15
Abilene	1,745	28.18		30.03	30.33	21	29.64	19	0.68	53.4		87.0	24	66.2	21.8	30	43.4	65.2	38.7	31	4.5	3	67.4	41.3	2.47		9,093	s.	36	s.	24	8	4	14	13
Fort Davis	4,928	25.12	—.05	29.90	30.21	22	29.70	11	0.51	52.6	— 1.7	81.3	24	66.9	23.0	30	39.4	58.3	42.2	31	12.7	11	34.7	20.4	0.26	— 0.15	6,244	w.	32	sw.	19	3	1	9	21
Fort Stockton	4,010	26.93	—.06	29.97	30.22	21	29.66	11	0.55	55.1	— 1.6	89.2	23	72.9	19.8	30	39.0	69.4	47.7	23	13.0	6	42.4	27.9	0.08	— 1.30	7,348	s.	47	nw.	19	2	2	15	14
Fort Stanton		[illegible]				22		10	0.60	39.2		70.5	24	55.1	12.5	9	24.9	56.0	44.6	10	9.7	2	57.8	24.0	0.50		7,795	nw.	48	nw.	8	3	1	10	20
Southern plateau.																																			
El Paso	3,764	26.20	—.04	29.96	30.26	22	29.60	10	0.66	52.9	— 3.8	82.3	23	68.2	29.0	21	39.0	53.3	46.3	23	16.8	29	36.4	23.8	0.28	— 0.24	4,199	w.	25	w.	10	1	4	9	18
Lava§										48.5		79.5	23	65.9	19.0	13	31.1	60.5							0.06							2			
Santa Fé	7,026	23.15	—.06	30.05	30.34	22	29.72	10	0.63	35.0	— 4.5	65.5	23	47.5	4.0	29	24.0	61.5	37.8	30	12.0	2	53.5	17.1	0.47	— 0.12	6,545	n.	29	sw.	10	6	1	7	23
Fort Apache	5,050	24.99	—.03	29.99	30.21	21	29.72	10	0.48	42.1	— 2.9	76.0	23	59.8	18.6	30	25.7	57.4	47.7	30	12.8	2	54.0	24.0	1.06	— 0.78	5,605	ne.	33	nw.	27	5	1	11	19
Fort Bowie										48.8		76.9	24	59.7	28.0	3	38.0	48.9							0.48							3			
Fort Grant	4,856	25.16		29.96	30.18	22	29.72	10	0.46	47.5	— 4.5	77.1	23	60.2	28.2	12	37.9	48.9	31.0	31	13.5	3	42.8	24.0	0.53	— 0.89	6,149	n.	34	w.	10	5	0	8	23
Fort McDowell																																			
Fort Thomas	2,710	27.18		29.93	30.17	7	29.69	10	0.48	49.2	— 4.6	83.0	23	66.6	21.2	30	33.2	61.8	48.8	30	8.1	3	57.2	30.8	0.44	— 1.00	3,716	w.	26	n.	18	2	1	7	23
Fort Verde										48.3		70.0	22	64.0	26.5	11	32.7	52.5							2.09							4			
Maricopa										57.6		87.1	23	72.4	35.5	4	42.8	51.6							1.71							4			
Phœnix										57.3	— 4.4	93.6	24	79.4	23.6	18	35.3	70.0							0.86	+ 0.09						2			
Prescott	5,389	24.66	—.03	30.03	30.30	22	29.70	18	0.59	38.7	— 4.5	69.7	2	51.8	12.3	4	27.1	57.4	37.5	22	10.4	2	69.8	27.9	3.04	+ 1.62	5,248	sw.	36	sw.	18	7	1	11	19
San Carlos										51.7		80.9	23	67.4	31.4	20	36.1	49.5							0.82	— 0.81						6			
Willcox										48.3		83.0	23	68.1	21.5	20	28.6	61.5							0.15							4			
Yuma	141	29.83	.00	29.95	30.18	7	29.69	1	0.49	60.5	— 4.3	88.0	23	74.1	38.1	12	47.2	49.9	36.6	23	11.7	1	50.3	38.9	0.33	+ 0.11	5,251	w.	36	w.	18	3	2	7	22
Middle plateau.																																			
Fort Bidwell		25.35				12		17	0.73	35.3		66.8	30	45.6	18.0	10	26.5	46.8	33.0	29	8.8	13	66.7	25.3	1.48		4,143	w.	23	sw.	7	13	6	15	10
Winnemucca	4,358	25.59	—.03	30.09	30.43	12	29.66	18	0.77	36.4	— 5.3	68.3	30	48.6	15.6	19	24.4	52.7	45.3	30	10.2	5	49.6	16.9	0.82	+ 0.03	6,779	sw.	40	sw.	13	11	4	18	9
Salt Lake City	4,348	25.59	—.04	30.10	30.40	21	29.62	18	0.79	36.6	— 5.4	67.9	23	46.8	18.1	28	28.6	49.8	30.6	31	8.7	27	67.7	26.6	2.60	+ 0.70	3,736	nw.	25	s.	16	13	9	13	9
Montrose	5,825	24.22		30.15	30.47	22	29.75	10	0.72	33.1		66.4	23	48.0	7.2	29	22.3	59.2	41.6	23	12.7	8	65.0	21.0	0.49		5,452	se.	36	sw.	18	12	6	19	6
Fort Bridger		23.39				21		10	0.70	24.6		50.0	23	35.1	— 5.8	28	14.2	55.8	37.2	21	10.6	19	75.2	17.2	0.82		8,153	sw.	40	sw.	13	10	6	17	8
Northern plateau.																																			
Boisé City	2,750																																		
Cœur d'Alene										37.6		63.0	30	46.7	12.0	1	28.6	51.0							2.07	+ 1.32						11			
Lewiston																																			
Ashland										43.7		72.0	30	55.6	24.0	1	31.8	48.0							1.43							13			
Fort Klamath										33.8		64.0	30	45.4	11.0	11	22.2	53.0							3.69							13			
Lake View										35.4		73.0	30	49.4	14.0	14	21.4	59.0							0.95							11			
Linkville										38.0		66.3	30	47.8	20.9	3	28.3	45.6							1.53							16			
Fort Spokane										40.6		75.8	31	51.3	19.4	1	29.9	56.4							0.79							6			
Spokane Falls	1,909	27.96	—.04	30.10	30.41	24	29.61	13	0.80	40.0	— 0.1	67.5	31	51.0	20.0	1	30.8	45.7	33.5	31	9.7	22	78.1	33.5	1.07	+ 0.05	4,988	sw.	42	sw.	23	5	6	12	13
Walla Walla	†1,018	28.95				24		31	0.77	44.5		73.8	o	54.5	22.4	1	26.4	51.4	29.0	31	10.5	15	56.9	28.9	1.06		6,256	sw.	44	sw.	13	7	9	15	7
N. Pac. coast region.																																			
Fort Canby	179	29.81	—.05	30.01	30.45	25	29.63	16	0.82	44.1		56.0	31	49.0	35.2	16	40.3	20.8	12.8	31	6.0	14	90.2	41.1	8.26		8,464	sw.	46	sw.	21	20	16	10	5
Neah Bay										42.6		56.0	31	49.6	27.0	4	35.6	29.0							12.90							17			
Olympia	36	30.00	—.03	30.05	30.50	24	29.73	13	0.78	42.4	— 2.1	65.2	30	51.8	23.1	1	33.9	42.1	32.8	29	4.1	21	82.5	37.2	4.07	— 0.83	3,791	s.	20	s.	19	18	10	10	11
Port Angeles	14	29.98		30.00	30.50	26	29.64	21	0.86	39.7		57.3	21	48.3	25.9	1	32.8	31.4	20.1	8	6.3	12	87.4	35.9	3.23		3,138	s.	24	w.	13	16	12	11	8
Pysht										42.0		57.0	31	50.0	26.0	1	34.0	31.0							7.91							18			
Tatoosh Island	86	29.89	—.06	29.99	30.48	26	29.65	8	0.83	43.4		51.9	31	47.4	33.0	16	39.2	18.9	20.0	18	3.4	21	82.3	38.2	10.89		10,216	sw.	47	nw.	13	19	14	9	8
Astoria										44.0		56.0	30	50.1	30.0	18	37.9	53.0							7.23							20			
Portland	80	29.98	—.01	30.07	30.52	25	29.76	16	0.75	44.8	— 2.6	79.0	29	54.3	30.0	4	37.5	49.0	39.0	29	5.0	21	77.4	37.5	5.39	— 1.04	4,143	s.	23	s.	16	14	9	10	12
Roseburg	523	29.52	—.01	30.09	30.51	25	29.74	2	0.78	45.1	— 2.6	73.8	29	55.9	28.3	1	36.5	45.5	37.9	29	9.0	15	72.2	35.7	3.03	— 0.46	1,726	n.	14	s.	6	13	12	9	10
Mid. Pac. coast reg.																																			
Cape Mendocino	637	29.38		30.06	30.33	11	29.67	1	0.65	46.1	— 3.0	55.7	22	51.1	35.8	10	41.5	19.9	15.4	2	6.0	8	80.3	40.2	2.08	+ 0.23	16,401	nw.	70	se.	8	10	9	13	9
Red Bluff	332	29.71	+.01	30.05	30.35	7	29.63	1	0.71	52.8	— 2.4	74.6	12	62.0	35.0	1	43.8	39.6	29.4	12	10.0	4	63.3	38.4	1.31	— 1.80	5,732	n.	28	s.	17	11	11	8	12
Sacramento	64	29.99	.00	30.04	30.35	7	29.63	17	0.72	52.1	— 2.9	72.0	29	60.8	37.7	19	44.2	34.3	26.3	29	8.3	4	70.6	41.7	2.68	— 0.67	6,567	nw.	37	nw.	14	15	5	12	14
San Francisco	60	30.01	.00	30.06	30.36	7	29.66	1	0.70	52.6	— 1.0	73.1	26	60.7	41.0	18	46.6	32.1	24.1	26	6.5	17	68.6	41.4	2.07	— 0.04	5,949	w.	31	w.	13	13	5	11	15
S. Pac. coast region.																																			
Los Angeles	339	29.68	.00	30.03	30.26	7	29.68	7	0.57	54.3	— 1.8	76.0	21	65.6	37.2	19	45.3	38.8	28.8	15	11.9	25	80.9	47.9	2.52	— 0.49	4,555	w.	25	w.	18	8	6	11	14
San Diego	67	29.97	—.02	30.01	30.23	7	29.70	7	0.53	55.0	— 1.0	68.2	30	62.2	40.7	19	48.0	27.5	20.6	12	7.1	1	77.4	47.7	3.73	+ 2.39	4,011	w.	28	s.	18	9	1	18	12
San Luis Obispo	270	29.74		30.01	30.26	7	29.63	17	0.63	50.4		72.3	26	61.7	34.1	21	42.0	38.2	36.4	21	10.4	30	79.9	43.8	2.42		4,938	w.	42	n.	10	9	5	11	15

*96.3, record for 30 days. †20,250, record for 24 days. ‡ Record for 27 days. § Record for 28 days.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for March, 1886, states:

The verifications of predictions for the whole area was 88 per cent. for temperature, and 85 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; and the cities of Milledgeville, Georgia, and Talladega, Alabama.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays occurred during the month, as follows:

Saint Vincent, Minnesota: an aurora was observed at 10.15 p. m. of the 3d, extending from 165° to 270° azimuth, with an altitude of from 15° to 20°. It consisted of a pale diffused light, without any perceptible motion, and continued until after midnight.

Eastport, Maine: a faint auroral light was observed from 9 to 10 p. m. of the 7th.

Saint Vincent, Minnesota: an aurora was observed about 10° to the west of the northern horizon at 10.20 p. m. of the 9th, extending over 40° of azimuth, with an altitude of 15°, consisting of pale yellow beams of light, which rose and fell at irregular intervals, being apparently drawn to and repelled from the magnetic zenith. The aurora was still visible at midnight, but had diminished greatly in intensity, and disappeared during the early morning of the 10th.

Fort Totten, Dakota: an auroral light was observed from 8.40 to 11.50 p. m. of the 21st, having an altitude of 15° and azimuth 100°; at 9.40 p. m. it assumed an arch formation above a dark segment, which disappeared at 10.10 p. m. Shooting beams were also observed.

Mackinaw City, Michigan: a faint auroral light was observed at 8.30 p .m. of the 26th, of 90° azimuth and 20° altitude; the display continued until the early morning of the 27th.

Fort Buford, Dakota: an aurora was observed at 9.25 p. m. of the 26th, continuing until the early morning of the 27th, consisting of arch of a whitish color of about 15° altitude, and extending from northwest to northeast; streamers, of a reddish tinge, having an upward and lateral motion, would rise to an altitude of about 30° above the arch.

Marquette, Michigan: a faint auroral arch was observed from 10 to 11.30 p. m. of the 26th, having an altitude of 20° and extending over 120° of azimuth.

Saint Vincent, Minnesota: at 10.43 p. m. of the 26th an aurora was observed in the northern horizon; the tints were very beautiful, and varied from an emerald green to a lemon color. The arch upon which the aurora rested was clearly defined, but presented an undulating appearance during the early stage of the display, changing gradually until at the period of maximum brilliancy it formed a perfect segment, from behind which the light shot upwards in broad tapering bands to a height of 45°. When several of these streamers would surge upwards simultaneously, the light was so intense that objects would cast a shadow, and when disappearing, the whole northern quarter would glow with a pale green hue. No marked exhibition of "merry dancers" was observed in connection with this display, the light being thrown upwards in a succession of phenomenally brilliant waves and disappearing so rapidly as to apparently leave a nebulous cloud floating in the atmosphere. No corona or glory was formed. The aurora continued until 2.10 a. m. of the 27th, and during its prevalence extended from 165° to 210° azimuth, with an altitude of 45°.

Escanaba, Michigan: an aurora was observed from 9 p. m. to midnight of the 26th, consisting of a diffused pale yellow light, resting upon a narrow dark segment.

Alpena, Michigan: an aurora was observed from 10 to 11.30 p. m. of the 26th, consisting of a diffused light, resting on a dark segment in the northern horizon.

Eastport, Maine: an auroral light of a whitish color was observed from 6.45 to 11 p. m. of the 26th.

Mackinaw City, Michigan: a faint auroral light was observed from 9.10 to 11.40 p. m. of the 27th, of 50° azimuth and 20° altitude.

Escanaba, Michigan: a faint aurora was observed from 10.10 to 11.41 p. m. of the 27th, having an altitude of 15°.

Gardiner, Kennebec county, Maine: a brilliant aurora was observed at 8 p. m. of the 28th; previous to 9 p. m. beams were observed to shoot up from a dark cloud, after which hour the aurora gradually faded away, and before 11 p. m. had entirely disappeared.

Fort Bidwell, California: a brilliant aurora was observed in the north from 2.15 to 3.20 a. m. (local time) of the 30th, consisting of two distinct parallel arches, the upper arch having an altitude of 25° and extending over 20° of azimuth; the extremities of either arch did not approach within 3° of the horizon. The lower arch was well defined and of a dark red color, resting on an extremely black base; the upper arch was a bright red, its upper edge being poorly defined and blending with the straw color of the atmosphere between it and the zenith. Several luminous beams, having a lateral motion, were observed to shoot up from the lower arch, but owing to the rapidity of their movement, it was impossible to ascertain their altitude with any degree of accuracy.

Saint Paul, Minnesota: a faint auroral display was observed from 10.03 to 11.45 p. m. of the 30th, consisting of a pale white light above a dark slate-colored bank, and extending from 170° to 200° azimuth, with an altitude of 20°.

Yankton, Dakota: a faint aurora was observed from 9.40 to 10.45 p. m. of the 30th, consisting of an arch of white light with three streamers, having an altitude of 20° and extending from 195° to 250° azimuth.

Port Angeles, Washington Territory: an aurora was observed during the evening of the 30th, the time of beginning and ending not being known. It had the form of an arched band of yellow light about 4° in width, with an altitude of 25°, and extending about 45° east and west of the magnetic meridian. The segment was well defined and very dark, with an altitude of about 20°.

Duluth, Minnesota: a very bright aurora was observed from 4 a. m. to daylight of the 30th, consisting of bright, straw-colored beams often passing the zenith, and with an occasional lateral motion.

Bismarck, Dakota: an auroral light of a pale yellow color, above a dark segment 2° in altitude, was observed from 9.45 to 11.30 p. m. of the 31st, extending from 136° to 226° azimuth, with an altitude of 10°.

Poplar River, Montana: a brilliant aurora was observed from 2.30 to 4.30 a. m. of the 30th, and from 10 p. m. of the same date to 3 a. m. of the 31st, the latter display consisting of a diffused light of a pale straw color.

Fort Buford, Dakota: an aurora was first observed at 10.20 p. m. of the 30th, consisting of an arch of diffused white light, resting on a dark base and extending from northwest to northeast, of about 35° altitude; streamers of a bright white color rose from the northwestern portion of the arch between 10.48 and 11 p. m., reaching, at their maximum, about 60° in altitude. The arch grew fainter after 11 p. m., and entirely disappeared at 11.40 p. m.

Fort Buford, Dakota: an aurora was observed from 9.52 to 11.55 p. m. of the 31st, consisting of a diffused whitish light, forming an irregular arch of 25° in altitude, and extending from northwest to northeast. No dark segment was observed, as the light extended to the horizon, the northern portion being much brighter than the extremities.

Grand Forks, Grand Forks county, Dakota: a moderate auroral arch was observed on the 31st, extending from northwest to northeast, with numerous streamers of a pale white and greenish tint, shooting upwards to an elevation of 45°.

Auroral displays were also observed during the month, as follows:

4th.—Windsor, Illinois.
5th.—Kent's Hill, Maine.
6th.—Eastport and Kent's Hill, Maine; Fort Totten, Dakota.
10th.—Pekin, Illinois; Manistique, Michigan.
11th.—Manistique, Michigan.
12th.—Wakefield, Kansas; Manistique, Michigan; Garrettsville, Ohio.
15th.—Pekin, Illinois.
16th.—Pekin, Illinois; Tiffin, Ohio.
17th.—Pekin, Illinois.
18th.—Gardiner, Maine.
19th.—Dover, New Jersey.
21st.—Webster, Dakota; Dover, New Jersey.
22d.—Escanaba, Traverse City, and Manistique, Michigan; Embarras, Wisconsin.
24th.—Moorhead, Minnesota.
26th.—Fort Totten, Dakota; Saint Vincent and Bird Island, Minnesota; Traverse City and Manistique, Michigan; Berlin Mills, New Hampshire; Gardiner, Orono, Cornish, and Kent's Hill, Maine; Embarras, Wisconsin.
27th.—Marquette, Michigan; Fort Benton, Montana; Kent's Hill, Maine.
28th.—Eastport, Orono, Cornish, and Kent's Hill, Maine; North Colebrook, Connecticut; Nashua, New Hampshire; Lunenburg and Poultney, Vermont; Cambridge and Fall River, Massachusetts; Mountainville and Plattsburg Barracks, New York; Manistique, Michigan.
29th.—Berlin Mills, Vermont.
30th.—Walla Walla, Washington Territory; Fort Benton, Montana; Fort Totten and Webster, Dakota; Moorhead and Bird Island, Minnesota.
31st.—Poplar River, Montana; Webster, Dakota; Bird Island, Minnesota.

THUNDER-STORMS.

Thunder-storms, with time of beginning, when given by the observer, were reported in the various states and territories, as follows:

Alabama.—Of general occurrence throughout the state on the 20th, and from the 27th to 30th.

Arkansas.—Little Rock, 11.25 p. m., 11th; 4 p. m., 16th; 29th. Fort Smith, 3.40 p. m., 16th; 10.45 p. m., 19th; 10.10 a. m., 28th. Lead Hill, 20th, 26th, 28th.

California.—Cahuenga, 11.07 a. m., 1st. Murietta, 1st. San Diego, 4 a. m., 1st; 2 a. m., 3d. Fall Brook, 4 p. m., 1st; 18th. Poway, 1st, 2d. Sacramento, 7.20 p. m., 4th. Los Angeles, 5.45 p. m., 5th.

Connecticut.—North Colebrook, 19th. New London, 10.55 a. m., 19th; 20th. New Haven, 10.27 p. m., 19th; 12.48 a. m., 20th; 9.10 p. m., 31st. Waterbury, 20th. Bethel, 20th, 31st.

Florida.—Archer, 3 p. m., 12th; 8 a. m., 16th; 6 a. m., 19th; 28th; 31st. Cedar Keys, 7.30 p. m., 12th; 1 a. m., 31st. Key West, 6.50 p. m., 9th; 22d. Merritt's Island, 12th, 13th, 14th, 17th, 21st. Limona, 13th, 14th; 4 a. m., 21st. Fort Gatlin, 14th. Sanford, 7.45 a. m., 13th; 21st. Pensacola, 20th, 28th, 30th; Jacksonville, 5.12 a. m., 31st. Tallahassee, 30th; and of general occurrence throughout the state on the 20th.

Georgia.—They were reported by numerous stations throughout the state on the 20th, 29th, and 30th, and at Savannah on the 31st.

Illinois.—Of general occurrence from the 17th to 20th, and on the 28th; also reported at Cairo on the 29th.

Indiana.—LaGrange, 18th; Lafayette, evening, and Fort Wayne, 4 a. m., 19th. Vevay, 1.30 a. m., and Sunman, 1 a. m., 29th; and from all sections of the state on the 20th and 28th.

Indian Territory.—Fort Reno, 3.35 p. m., 8th.

Iowa.—Of general occurrence on the 17th and 19th; also reported at Cresco, 10.15 p. m., and Monticello, ½ p. m., 18th. Oskaloosa, 20th. Davenport, 4.50 p. m., 18th; 12.45 a. m., 20th.

Kansas.—Ninnescah, 4.15 p. m., 4th; 2.55 p. m., 11th; 25th. El Dorado, 6.30 p. m., 11th. Yates Centre, 5.15 p. m., 11th; 7 p. m., 19th. Wellington, 11th, 28th. Fort Scott, 6.45 p. m., 11th; 6 p. m., 19th. Leavenworth, 18th. Wyandotte, 5 p. m., and Independence, 6 p. m., 19th.

Kentucky.—Frankfort, Richmond, 6.15 p. m., and Louisville, 5.15 p. m., 20th. Penrod, 28th.

Louisiana.—Grand Coteau, 4th, 27th, 28th, 29th, 30th. New Orleans, 3.20 a. m., 3d; 20th; 9.20 p. m., 29th; ended 3.15 a. m., 30th. Shreveport, 20th; 4.16 p. m., 26th. Luling, 29th, 30th.

Maine.—Portland, 2.15 a. m., and Gardiner, 3.45 a. m., 22d.

Maryland.—Fallston, 21st, 30th, 31st.

Massachusetts.—Amherst, 20th. Deerfield, 21st. Blue Hill, 22d. Somerset, 31st.

Michigan.—Of general occurrence throughout the state on the 18th, 19th; and at Escanaba, 7.38 p. m., 17th. Lansing, Pentwater, Port Huron, and Grand Haven, 12.02 a. m., 20th.

Minnesota.—They were reported from all stations on the 17th; and at Spring Valley, 18th. Albert Lea and Dodge City, 20th.

Mississippi.—Vicksburg, 5.19 p. m., 28th; ended 11.30 a. m., 29th.

Missouri.—Lamar, 10.20 p. m., 19th; 20th; 4 a. m., 28th. Carthage, 19th, 26th. Centreville, 20th, 28th, 29th.

Nebraska.—Marquette and Genoa, 18th. De Soto, 19th.

New Hampshire.—Nashua, 2.30 a. m., 22d.

New Jersey.—Of general occurrence on the 21st and 31st; and at Sandy Hook and South Orange, 19th. Dover, 3.15 p. m., 19th; 2 a. m., 20th.

New York.—Of general occurrence on the 19th, 20th; and reported at West Point, 29th, 31st; Mountainville, 9 p. m., and Setauket, 10 p. m., 30th; 8.30 and 9.30 p. m., 31st.

North Carolina.—Charlotte, 12.15 p. m., and Wilmington, 8.30 p. m., 20th; and of general occurrence on the 30th, 31st.

Ohio.—Wauseon, 19th, 20th. Napoleon and Jacksonborough, 20th. West Milton, 20th, 21st. Cincinnati, Ruggles, and Garrettsville, 7.10 a. m., 29th.

Pennsylvania.—Of general occurrence throughout the state on the 19th and 21st; and reported at Grampian Hills, 6 p. m., and Pittsburg, 8.07, 18th. Blooming Grove and Quakertown, 20th, 30th, 31st. Bethlehem and Zionsville, 7 p. m., 30th. Philadelphia, 6.40 p. m., 31st.

South Carolina.—General on the 20th; and reported from numerous stations on the 29th, 30th, 31st.

Tennessee.—They were reported from numerous stations on the 20th, 28th, 29th, and 30th.

Texas.—Silver Falls, 3d. Comfort, 2d, 3d, 15th, 26th. New Ulm, 3 p. m. 2d; 8.30 a. m. 4th; 3 a. m., 12th; 9.15 a. m., 16th; 10.30 p. m., 19th; 4 p. m., 26th. San Antonio, 3 p. m., 3d; 11.25 p. m., 11th; 16th; 10.12 a. m., 26th. Abilene, 7.30 p. m., 6th; 11.25 p. m., 15th; 11.10 a. m., 26th; 5.20 a. m., 28th. Corsicana, 1.30 a. m., 16th; 8 p. m., 19th; 6.30 a. m., 29th. Fort Stockton, 25th. Galveston, 27th.

Virginia.—Of general occurrence on the 30th, 31st.

Washington Territory.—Bainbridge Island, 13th.

West Virginia.—Parkersburg, 8 a. m., 20th. Helvetia, 30th.

Wisconsin.—General throughout the state on the 17th, 18th, 19th; also reported from numerous stations on the 20th, and at Manitowoc, 24th.

ATMOSPHERIC PHENOMENON.

The following is taken from the La Crosse, Wisconsin, "Daily Republican," of March 20, 1886:

OSHKOSH, WISCONSIN, *March* 19th.—A most remarkable atmospheric phenomenon occurred here at 3 p. m. The day was light, though cloudy, when suddenly darkness commenced settling down, and in five minutes it was as dark as midnight. General consternation prevailed; people on the streets rushed to and fro; teams dashed along, and women and children ran into cellars; all business operations ceased until lights could be lighted. Not a breath of air was stirring on the surface of the earth. The darkness lasted from eight to ten minutes, when it passed off, seemingly from west to east, and brightness followed. News from cities to the west say the same phenomenon was observed there in advance of its appearance here, showing that the wave of darkness passed from west to east. Nothing could be seen to indicate any air currents overhead. It seemed to be a wave of total darkness passing along without wind.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

Alabama.—11th, 16th.
Arizona.—30th.
California.—3d, 7th, 8th, 13th, 15th, 16th, 21st, 22d, 27th, 28th, 30th, 31st.
Colorado.—7th, 26th, 29th.
Dakota.—8th, 9th, 11th, 15th, 27th, 29th.
Florida.—6th, 20th.
Georgia.—2d, 8th, 11th.
Idaho.—10th, 19th.
Illinois.—3d, 14th, 17th, 18th, 24th, 25th, 27th.
Indiana.—3d, 4th, 7th.
Iowa.—2d, 4th, 20th, 21st.
Kansas.—7th, 19th.
Kentucky.—9th.
Maine.—8th, 19th.
Maryland.—24th, 25th, 27th.
Massachusetts.—8th, 18th, 24th, 26th, 27th.
Michigan.—11th, 12th, 14th, 15th, 22d, 23d, 24th, 28th.
Minnesota.—3d, 16th, 24th, 26th.
Missouri.—8th.
Montana.—27th.
Nebraska.—31st.
New York.—8th, 11th, 15th, 20th, 25th, 27th, 28th, 29th.
North Carolina.—4th, 8th, 12th, 15th, 16th, 26th, 29th.
Ohio.—5th, 7th, 11th, 13th, 14th, 17th, 19th, 24th to 28th.
Oregon.—15th, 16th, 31st.
South Carolina.—3d, 4th, 5th, 8th, 25th, 26th, 27th, 30th.
Tennessee.—2d, 4th, 8th, 11th, 16th, 17th, 18th, 25th.
Utah.—22d.
Vermont.—25th, 27th.
Virginia.—9th, 10th, 16th.
Washington Territory.—1st, 7th, 24th, 31st.
Wisconsin.—3d, 12th, 13th, 17th.
Wyoming.—1st, 7th, 9th, 11th, 20th, 21st, 28th, 29th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Alabama.—16th.
Arizona.—14th, 16th, 17th, 22d, 23d, 24th.
California.—14th, 16th, 17th, 19th to 23d, 27th.
Colorado.—11th, 16th.
Connecticut.—11th, 15th.
Dakota.—15th, 16th, 17th.
District of Columbia.—12th, 18th, 19th.
Florida.—11th, 19th.
Georgia.—10th, 11th, 19th.
Idaho.—17th, 20th.
Illinois.—13th, 17th, 18th, 19th, 24th.
Indiana.—13th, 17th, 18th, 19th.
Iowa.—14th, 16th, 19th, 20th.
Kansas.—7th, 16th, 18th, 21st, 22d.
Kentucky.—16th, 17th, 19th.
Louisiana.—18th.
Massachusetts.—8th, 11th, 14th, 18th, 19th.
Michigan.—12th, 14th, 16th to 19th, 22d, 24th, 25th.
Minnesota.—14th.
Missouri.—18th, 19th.
Montana.—15th, 17th, 18th, 20th.
Nebraska.—11th, 12th, 15th, 16th.
Nevada.—16th.
New Hampshire.—14th.
New York.—11th, 13th, 14th, 17th.
North Carolina.—16th.
Ohio.—11th, 13th, 17th, 18th, 19th, 24th.
Pennsylvania.—11th, 15th, 16th, 18th.
South Carolina.—11th, 16th, 19th, 25th.
Tennessee.—14th to 19th.
Texas.—9th, 10th, 13th to 21st.
Utah.—22d.
Vermont.—11th, 17th, 18th.
Virginia.—5th, 9th, 11th, 12th, 15th to 19th.
Washington Territory.—10th, 16th, 18th, 20th.
Wisconsin.—5th, 13th, 17th.
Wyoming.—11th, 15th.

The phases of the moon during March were: new moon, 5th, 5.04 p. m.; first quarter, 13th, 8.17 a. m.; full moon, 19th, 11.36 p. m.; last quarter, 26th, 5.44 a. m.; apogee, 1st, 11.15 a. m.; perigee, 17th, 5.14 a. m.

MIRAGE.

Indianola, Texas, 5th, 17th, 22d
Salina, Kansas, 8th, 9th, 31st.
Webster, Dakota, 16th, 22d, 30th.
Traverse City, Michigan, 23d.
Stowe, Vermont, 27th.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for March, 1886:

Date—March, 1886. Standard time.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 1 p. m.	1	20‡	0	0	.....	.....	5	65‡	
2, 2 p. m.	0	10‡	0	0	.....	.....	5	75‡	
4, 12 m.	4	40‡	.....	.....	4	15‡	8	110‡	
5, 4 p. m.	1	60‡	0	0	0	10‡	9	170‡	Broad areas of faculæ.
6, 5 p. m.	0	0	0	0	0	0	8	160‡	Do.
7, 4 p. m.	0	0	1	10‡	0	0	6	130‡	
10, 10 a. m.	0	0	.....	.....	0	0	5	85‡	
14, 10 a. m.	0	0	.....	.....	0	0	3	20‡	Broad areas of faculæ.
15, 4 p. m.	0	0	1	15‡	0	0	2	5	Do.
16, 5 p. m.	1	5	1	2	0	0	2	8	
17, 4 p. m.	0	9‡	1	3	0	0	1	15‡	
23, 4 p. m.	4	30‡	.....	.....	3	20‡	5	35‡	
24, 5 p. m.	0	10‡	0	0	.....	.....	5	45‡	
26, 10 a. m.	1	5‡	.....	.....	.....	.....	4	30‡	
28, 10 a. m.	0	25‡	0	0	.....	.....	4	55‡	

Faculæ were seen at the time of every observation. ‡Approximated.
NOTE.—From the 6th to 15th, one of the spots very large.

Mr. H. D. Gowey, of North Lewisburg, Champaign county, Ohio, reports having observed sun spots on the following dates: 1st, 3d, 4th, 6th, 10th, 12th, 15th, 17th, 18th, 19th, 23d, 24th, 31st.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-two stations show 5,019 observations to have been made, of which four were reported doubtful; of the remainder, 5,015, there were 4,416, or 88.1 per cent., followed by the expected weather.

EARTHQUAKES.

Butlerville, Jennings county, Indiana: a distinct shock of earthquake was felt about 10 a. m. of the 1st, lasting ten seconds; vibrations from northeast to southwest.

Makanda, Jackson county, Illinois: an earthquake shock occurred at 11.59 p. m. of the 17th, which was generally felt throughout the county.

Cairo, Illinois: a heavy shock of earthquake was felt at 11.15 a. m. of the 18th, lasting about fifteen seconds; vibrations from west to east; no damage was reported.

PRAIRIE FIRES.

Prairie fires were reported from the following stations:

Arkansas.—Fort Smith, 16th, 17th.
Dakota.—Yankton, 24th.
Indian Territory.—Fort Reno, 4th, 5th, 10th to 18th, 20th to 26th, 28th, 31st; Fort Sill, 5th, 8th, 10th to 13th, 17th to 26th; Fort Supply, 17th, 22d.
Kansas.—Concordia, 23d, 24th, 26th.
Montana.—Fort Keogh, 26th.

Nebraska.—Hay Springs, 23d; Meade, 24th.

Texas.—Fort Elliott, 14th to 26th; Abilene, 19th to 23d; Midland, 19th to 23d, 31st.

FOREST FIRES.

Cape Henry, Virginia, 25th.

Stateburg, South Carolina, 23d, 24th.

METEORS.

The following is from the "New York Herald" of March 2, 1886:

TRUMANSBURG, NEW YORK, *March* 1, 1886.—An unusually brilliant meteor was observed here this morning at a quarter past six o'clock during the prevalence of a gale and fall of fine snow. So remarkable, however, was the meteor that, although within twenty minutes of sunrise, it was plainly visible, notwithstanding the twilight and snow. Its path began at a point about a third of the way up from the horizon to the zenith, a little north of west, and ended low down in the southwest.

Wauseon, Fulton county, Ohio: a meteor was observed at 8.10 p. m. of the 16th, lasting about three seconds. It moved from the west, with a trail of light and smoke about 8° long; when about 25° west, of the zenith it burst into three parts. The color was a pale yellow before bursting, after which it was tinged with blue. The smoke and trail were visible about half a minute after the disappearance of the meteor.

Flora, Clay county, Illinois: a large meteor was observed on the 17th, moving in a straight line from east to west at an altitude of about 36°.

Cairo, Illinois: a bright meteor, with a trail of about 20°, was observed at 7.30 p. m. of the 17th. It started at an altitude of 45° above the eastern horizon and moved slowly towards the west; as it passed the zenith it burst into several pieces, making a vivid light, and changed its color to a bright orange. It disappeared at an altitude of 50° above the western horizon.

Meteors were also reported in the various states and territories, as follows:

Connecticut.—New Haven, 1st.

Illinois.—Eberle, 2d; Beardstown, 3d; Philo, 16th; Anna, 17th; Charleston and Mason City, 23d; Makanda, 25th.

Iowa.—Monticello, 27th; Oskaloosa, 16th.

Kansas.—Elk Falls, 24th.

Maryland.—Woodstock, 2d, 3d, 4th, 6th.

Minnesota.—Spring Valley, 16th.

Missouri.—Warrenton, 16th.

New Jersey.—Beverly, 4th, 6th; Dover and Egg Harbor City, 5th.

New York.—Mountainville, 6th.

Oregon.—Albany, 2d.

Pennsylvania.—Bethlehem, 5th; Fallsington, 10th.

Virginia.—Dale Enterprise, 18th, 23d.

Wyoming.—Fort Bridger, 8th.

POLAR BANDS.

Florida.—Archer, 6th, 30th.

Illinois.—Riley, 28th.

Kansas.—Ninnescah, 13th, 14th, 17th, 18th, 22d.

Maine.—Portland, 2d, 24th.

New Jersey.—Moorestown, 1st.

Ohio.—Wauseon, 11th, 17th, 24th; Napoleon, 13th, 17th.

Tennessee.—Nashville, 2d, 8th, 11th, 16th, 17th.

Texas.—El Paso, 16th, 27th, 31st.

Virginia.—Wytheville, 2d, 4th; Dale Enterprise, 5th, 24th.

Washington Territory.—Bainbridge Island, 27th.

Wisconsin.—Prairie du Chien, 25th.

Wyoming.—Fort Bridger, 21st.

SAND STORMS.

Yuma, Arizona, 9th, 10th, 18th.

El Paso, Texas, 10th, 18th, 26th.

Maricopa, Arizona, 10th.

Willcox, Arizona, 27th, 28th.

MIGRATION OF BIRDS.

Geese flying northward.—Wyandotte, Kansas, 1st; Yates Centre, Kansas, 1st, 12th; San Antonio, Texas, 4th; Anna, Illinois, 4th, 13th,; Independence, Kansas, 5th, 8th; Cedar Rapids, Iowa, and Garrettsville, Ohio, 6th; Wakefield, Kansas, 6th, 15th, 22d, 24th; Corsicana, Texas, Wytheville, Virginia, and Ocean City, Maryland, 7th; Portland, Oregon, 7th, 12th, 14th; Westmoreland, Kansas, 8th, 12th; Chicago, Illinois, 11th; Spartanburg, South Carolina, 12th; Fort Sill, Indian Territory, 12th, 13th, 25th; Lamar, Missouri, 12th, 28th; Salina, Kansas, 13th, 15th, 18th, 23d; Yutan, Nebraska, 13th, 18th; Indianola, Texas, 14th, 18th; Manchester, Iowa, 15th; Wellsborough, Pennsylvania, and Palestine, Texas, 16th; Fort Wayne, Indiana, and Independence, Iowa, 17th; Allison, Kansas, 18th; Factoryville, New York, University of Virginia, Virginia, and Fort Assinaboine, Montana, 19th; Webster, Dakota, 21st to 25th; Buckfield and Portland, Maine, and Fall River, Massachusetts, 22d; Bismarck, Dakota, Fort Scott, Kansas, and Manistique, Michigan, 23d; Fort Buford, Dakota, and North Platte, Nebraska, 23d, 24th; Palermo, New York, 26th, Poplar River, Montana, 27th; Albany, Oregon, 29th, 30th, 31st; Red Bluff, California, 30th; Moorhead, Minnesota, 31st.

Geese flying southward.—Rio Grande City, Texas, 4th; Wyandotte, Kansas, and Indianola, Texas, 5th; Independence, Kansas, 7th; Yates Centre, Kansas, 9th; Muscatine, Iowa, 15th; Yankton, Dakota, 17th; Red Bluff, California, 29th, 31st; Independence, Iowa, 31st.

Geese flying eastward.—Allison, Kansas, 6th, 14th; Block Island, Rhode Island, 22d.

Geese flying westward.—Yuma, Arizona, 16th.

Ducks flying northward.—Yates Centre, Kansas, 1st, 15th; Anna, Illinois, 4th, 13th; Wakefield, Kansas, 5th, 6th, 14th; Corsicana, Texas, 7th; Yutan, Nebraska, 7th, 16th, 18th; Westmoreland, Kansas, 8th, 12th; Spartanburg, South Carolina, 12th; Salina, Kansas, 13th, 15th, 18th, 23d; Wellsborough, Pennsylvania, 16th; Saint Vincent, Minnesota, 18th; Fort Assinaboine, Montana, 21st, 29th; Portland, Maine, 22d; Fort Buford, Dakota, 23d, 24th.

Ducks flying southward.—Muscatine, Iowa, 15th; Buckfield, Maine, 24th; Bismarck, Dakota, 27th; Indianola, Texas, 28th; Independence, Iowa, 31st.

Ducks flying westward.—Manchester, Iowa, 19th.

Cranes flying northward.—Salina, Kansas, 13th, 15th, 18th, 23d; Yutan, Nebraska, 17th; Yates Centre, Kansas, 24th.

Swans flying northward.—Yutan, Nebraska, 19th.

Meteorological record of voluntary observers and Army post surgeons, March, 1886.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature.			Rainfall.	Stations.	Temperature.			Rainfall.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean	
Alabama.	°	°	°	*Inches*	*California*—Cont'd.	°	°	°	*Inches*
Birmingham *	76	23	54.2	11.51	San Rafael	81	31	50.6	3.12
Greensborough	78	34	57.2	11.72	Santa Barbara	71	35	53.1	2.03
Mount Vernon B'ks.	78	32	58.5	7.59	Susanville	66	20	39.0	3.00
Arizona.					*Colorado.*				
Huachuca, Fort	81	25	49.8	0.20	Colorado Springs	69	—4	34.0	0.39
McDowell, Fort	88	29	55.4	1.12	Lyon, Fort	80	4	40.6	0.28
Verde, Fort	79	26	47.7	1.20	Pueblo	78	9	40.1	0.46
Arkansas.					Salida	62	0	32.5	0.17
Lead Hill *	88	24	46.4	4.87	*Connecticut.*				
California.					Bethel				3.55
Alcatraz Island	68	41	51.2	1.52	North Colebrook *	59	—10	27.9	2.59
Angel Island	80	40	53.8	1.75	Voluntown	54	1		3.95
Benicia Barracks	71	42	52.0	2.28	*Dakota.*				
Bidwell, Fort	62	20	38.1	0.78?	Abr. Lincoln, Fort	64	—22	23.8	0.88
Blue Lake*	71	26	43.1	6.51	Pembina, Fort	42	—15	16.9	0.35
Cahuenga				2.61	Randall, Fort	69	—5	30.0	1.30
Fall Brook *	76	39	52.6	4.70	Richardton	52	—13	24.7	1.00
Gaston, Fort	80	27	49.3	2.38	Sisseton, Fort	61	—12	23.4	0.55
Hydesville				3.13	Sully, Fort	77	—9	30.0	0.80
Mason, Fort	69	47	56.8	1.74	Totten, Fort	43	—13	18.5	0.73
Murietta *	80	30	49.9	5.94	Vermillion *	58	—10	29.0	2.40
Nicolaus *	76	38	52.4	1.50	Webster	69	—9	28.6	2.02
Oakland	72	25	51.3	2.57	Yates, Fort	67	—20	26.9	0.68
Oroville *	75	40	55.2	2.70	*District of Columbia.*				
Poway *	73	40	52.0	3.24	Distributing Res'r*	70	17	43.1	4.72
Presidio of San F	74	37	51.7	1.92	Kendall Green	66	15	41.1	4.04
Princeton *	73	34	52.9	0.92	Receiving Res'v'r*	68	14	42.4	4.58
Sacramento*	78	34	52.6	2.33	Rock Creek Bridge*	72	19	45.6	
Salinas	68	35	49.2	2.16					

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Florida.	°	°	°	*Inches*
Archer *	84	26	56.7	12.33
St. Augustine, Fort	79	39	58.7	7.61
Gatlin, Fort	89	39	.....	.....
Limona *	92	36	66.5	5.78
Manatee *	90	41	65.2	5.20
Meade, Fort	.....	.....	.....	5.25
Merritt's Island	81	42	63.2	4.99
Tallahassee *	72	32	.....	9.79
Georgia.				
Athens	74	25	51.2	9.74
Dahlonega *	71	20	48.6	13.47
Forsyth *	80	30	54.6	8.67
Milledgeville	78	26	53.9	5.71
Quitman *	80	33	57.6	9.10
Idaho.				
Boise Barracks	68	20	41.7	0.83
Cœur d'Alene, Fort	70	12	38.7	2.16
Illinois.				
Anna *	80	21	43.8	4.05
Bloomington	75	12	38.4	1.81
Bunker Hill	84	18	40.0	2.86
Beardstown *	80	22	39.6	.....
Collinsville	80	20	42.3	2.77
Charleston *	78	11	41.0	3 32
Geneseo *	73	3	33.4	3.17
Mattoon *	80	15	40.5	3.55
Pekin *	79	12	34.9	2.70
Peoria	78	17	40.2	2.25
Riley	67	5	30.2	3.68
Rockford *	66	— 6	30.8	4.55
South Evanston	72	9	.....	2.28
Sycamore	70	4	31.6	3.85
Windsor	77	10	38.2	2.60
Indian Territory.				
Reno, Fort	89	15	47.0	0.00
Supply, Fort	86	8	43.4	0.34
Indiana.				
Fort Wayne *	75	13	39.0	4.01
Guilford *	74	10	39.9	2.30
Jeffersonville	70	20	43.4	2.83
Knightstown	76	12	38.8	1.85
Laconia	80	20	42.7	2.68
Lafayette	76	10	37.8	2.04
Latirange	73	7	34.4	2.27
Mauzy	72	10	34.7	2.88
Spiceland	74	14	38.4	2.72
Sunman *	74	13	40.5	2.80
Terre Haute *	76	22	.....	3.67
Vevay	79	17	43.4	2.18
Iowa.				
Bancroft	55	— 2	27.4	1.83
Cedar Rapids *a*	68	6	28.7	4.47
Cedar Rapids *b* *	66	— 2	30.8	.....
Clinton *	71	— 5	32.1	4.45
Cresco	59	— 9	26.1	2.04
Des Moines	73	6	34.4	.....
Humboldt	60	0	29.7	1.40
Independence *	60	2	30.2	1.98
Logan	64	2	32.2	2.50
Fort Madison	72	7	.....	.....
Manchester	62	5	31.5	2.09
Monticello *	67	0	30.2	3.50
Mount Vernon *	63	7	33.5	.....
Muscatine	70	0	32.4	4.16
Oskaloosa *a*	74	11	33.2	1.43
Oskaloosa *b* *	66	8	.....	.....
Kansas.				
Allison	78	2	35.9	1.62
Atchison *	74	10	37.5	0.95
El Dorado	78	5	40.3	.....
Elk Falls	.....	.....	.....	1.46
Emporia *	80	10	40.7	2.25
Hays, Fort	74	— 4	37.0	2.39
Independence *	83	14	43.1	1.68
Lawrence	79	11	40.4	1.63
Manhattan *a*	80	8	38 8	2.21
Manhattan *b* *	82	9	39.2	1.55
Ninnescah	89	12	41.1	1.01
Ottawa	82	12	40.5	2.27
Riley, Fort	80	8	39.7	1.05
Salina	61	14	40.0	0.07
Sterling	80	10	37.7	3.30
Topeka *a*	82	9	45.0†	1.84
Topeka *b* *	80	10	38.3	1.70
Wellington	81	14	42.1	1.59
Wakefield *	69	10	38.2	0.80
W. Leavenworth *	80	13	.....	0.34
Westmoreland *	80	8	38.0	3.50
Wyandotte	78	12	33.0	1.81
Yates Centre	86	9	40.5	1.83
Kentucky.				
Frankfort	77	19	43.6	4.44
Richmond	74	18	42.9	5.02
Louisiana.				
Grand Coteau	78	36	60.2	5.92
Liberty Hill *	75	40	58.0	5.17
Luling *	86	36	.....	6.94
Maine.				
Bar Harbor	56	— 9	.....	3.28
Buckfield *	48	—11	.....	1.38
Cornish *	49	— 8	27.9	3.85
Gardiner	48	— 9	29.4	3.90
Maine—Cont'd.				
Kent's Hill	43	—11	26.4	3.12
Orono *	46	—19	26.9	2.87
Maryland.				
Cumberland	68	12	40.2	3.53
Emmittsburg	62	14	39.0	5.79
Fallston *	68	12	39.4	6.03
Great Falls *	68	13	40.4	4.16
McDonogh	63	9	47.5	5.50
McHenry, Fort	69	15	42.2	4.80
Woodstock	67	10	39.6	5.74
Massachusetts.				
Amherst *a*	61	3	34.4	3.50
Amherst *b*	61	— 1	33.5	3.31
Blue Hill Obs'y	59	— 3	30.6	3.05
Deerfield	59	— 2	32.8	3.28
Dudley	57	—12	32.0	2.98
Fall River	68	11	33.6	3.85
Heath	50	— 6	.....	.....
Milton	65	0	34.1	1.86
New Bedford	58	2	33.5	4.99
Princeton	46	— 6	28.9	3.54
Quincy	67	0	32.3	3.38
Somerset *	68	1	35.1	4.09
Taunton	65	1	35.0	3.52
Worcester *	59	— 1	30.9	3.57
Westborough *	65	4	35.5	3.63
Williamstown	64	— 5	30.2	5.01
Michigan.				
Birmingham	54	4	.....	2.50
Brady, Fort	45	—20	24.6	1.78
East Saginaw	58	5	31.8	3.08
Harrisville *	48	1	.....	.....
Hudson	73	5	.....	0.75
Kalamazoo	68	7	.....	1.64
Lansing	67	5	32.1	2.83
Manistique	61	—10	27.8	3.52
Mottville *	74	7	.....	.....
Pentwater	60	— 3	29.5	4.24
Thornville	54	6	32.6	1.89
Traverse City *	52	— 2	.....	4.60
Minnesota.				
Minneapolis	60	— 9	27.5	1.51
Northfield	54	—13	26.9	2.06
Preston *	51	—16	.....	.....
Snelling, Fort	56	—12	27.3	0.95
Missouri.				
Carthage	82	17	45.8	1.65
Central College *	80	21	40.6	2.35
Centreville	77	19	.....	3.87
Conception *	74	4	34.9	.....
Pierce City *	81	19	42.3	3.30
Springfield *	80	19	42.8	1.50
Warrenton *	82	18	40.4	.....
Montana.				
Assinaboine, Fort	65	—19	28.1	1.18
Ellis, Fort	67	—14	27.5	1.68
Keogh, Fort	75	— 8	30.4	0.68
Missoula, Fort	62	11	35.2	0.37
Shaw, Fort	68	—20	32.3	0.55
Nebraska.				
Brownville *	67	2	36.3	2.02
De Soto *	59	0	32.2	3.16
Fairbury	.....	.....	.....	2.56
Fremont *	56	— 6	34.2	4.93
Genoa	61	— 7	29.0	0.82
Hay Springs *	68	—15	27.9	1.51
Marquette	.....	.....	.....	3.52
Niobrara, Fort	77	— 7	29.5	1.72
Robinson, Fort	73	— 8	33.4	1.74
Sidney, Fort	75	—12	30.5	0.59
Stockham	.....	.....	.....	2.00
Yutan *	61	— 4	32.8	2.71
Nevada.				
Carson City	70	19	38.7	1.60
Halleck, Fort	65	10	32.8	1.10
McDermit, Fort	69	15	35.2	0.50
New Hampshire.				
Ashland	.....	.....	.....	3.14
Belmont	.....	.....	.....	3.41
Berlin Mills	51	—14	25.1	.....
Bristol	.....	.....	.....	3.16
Lake Village	.....	.....	.....	3.68
Nashua	61	— 3	31.9	2.99
Wier's Bridge	.....	.....	.....	3.19
Wolfborough	.....	.....	.....	2.28
Woodstock	.....	.....	.....	4.13
New Jersey.				
Beverly *	68	12	38.5	3.64
Clayton *	70	13	39.0	2.59
Dover *	66	9	35.0	3.23
Egg Harbor City	68	15	41.2	4.50
Moorestown	64	12	37.5	3.54
Paterson *	65	13	37.3	3.84
Phillipsburg	.....	.....	.....	3.66
Princeton	67	10	37.2	3.41
Readington *	60	12	39.0	.....
South Orange *	62	10	37.7	3.47
Vineland	66	15	40.3	3.81
New Mexico.				
Bayard, Fort	80	12	44.5	0.18
Galinas Spring	70	22	.....	1.00
Puerto de Luna	77	21	45.1	0.81

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
N. Mexico—Cont'd.	°	°	°	*Inches*
Selden, Fort	86	20	41.4	0.00
Union, Fort	71	3	36.5	0.50
Wingate, Fort	65	12	34.3	0.82
New York.				
Auburn	63	— 2	33.4	3.78
Columbus, Fort	62	10	36.8	3.33
Cooperstown *	68	—10	29.0	2.92
David's Island	60	20	35.9	23.3
Factoryville *	65	4	33.5	1.98
Humphrey *	60	— 6	30.4	2.57
Ithaca	66	— 3	32.5	2.50
LeRoy	67	0	31.4	2.24
Madison Barracks	63	— 9	28.5	2.72
Menand Station	61	— 3	32.2	2.63
Mountainville	66	4	34.6	3.80
Niagara, Fort	51	1	31.8	1.99
North Volney *	65	— 5	30.3	3.25
Palermo *	63	—11	28.2	1.68
Palmyra *	66	1	32.2	.....
Penn Yan	.....	.....	.....	1.18
Plattsburg B'ks	62	—16	26.4	1.42
Setauket	65	8	35.5	3.18
Syracuse	71	— 8	.....	.....
West Point	62	5	35.7	3.98
White Plains	58	3	35.5	2.65
North Carolina.				
Chapel Hill	80	24	49.0	4.97
Flat Rock	71	20	43.8	8.64
Lenoir	.....	.....	.....	3.40
Lincolnton	67	26	45.1	5.89
Raleigh *	81	27	49.0	3.80
Reidsville *	80	20	45.7	0.69†
Statesville *	74	22	47.0	4.91
Wake Forest *	79	25	49.3	4.22
Weldon *	79	25	48.2	4.01
Ohio.				
Cleveland	66	7	36.6	2.41
Clyde	65	20	.....	.....
College Hill *	80	12	42.8	1.25
Fostoria *	81	5	36.1	1.98
Garrettsville	73	0	33.6	2.69
Hiram	72	4	34.3	1.71
Jacksonborough *	70	12	38.8	2.35
Napoleon	72	8	37.3	1.38
North Lewisburg	73	6	40.5	2.60
Ruggles *	70	6	35.3	2.00
Tiffin *	74	6	34.4	2.16
West Milton	74	12	43.0	3.50
Wauseon	75	5	34.5	1.56
Westerville	73	10	37.7	2.11
Yellow Springs	74	10	39.3	1.94
Oregon.				
Albany *	72	30	46.4	3.19
Bandon *	55	28	41.5	5.81
East Portland *	68	26	.....	3.04
Eola *	64	28	42.8	3.67
Klamath, Fort	70	10	34.1	1.54
Pennsylvania.				
Altoona	66	10	40.6	2.20
Bethlehem *	68	9	38.8	4.08
Blooming Grove *	62	— 2	.....	5.30
Catawissa *	68	1	37.2	4.13
Dyberry *	62	— 6	31.2	3.51
Easton	.....	.....	.....	4.11
Fallsington	65	12	37.0	3.53
Franklin *	64	0	29.8	3.40
Germantown *	64	10	.....	2.67
Grampian Hills *	64	4	32.8	3.62
Mahanoy Plane	64	7	39.2	7.59
Philipsburg *	69	0	36.4	.....
Quakertown *a*	63	8	35.6	4.46
Quakertown *b* *	67	19	36.0	.....
Troy *	62	— 4	32.6	.....
Pennsylvania—Con.				
Wellsborough *	68	4	36.0	8.25
West Chester	66	8	37.8	4.87
Wilkesbarre *a*	64	1	33.4	3.98
Wilkesbarre *b*	68	3	35.9	4.10
Wysox	66	3	34.2	2.82
Zionsville	60	8	40.3	7.00†
South Carolina.				
Aiken *	80	28	55.3	5.75
Kirkwood *	72	24	50.0	3.40
Pacolet *	.....	.....	.....	6.43
Spartanburg	57	42	50.4	7.70
Stateburg *	77	28	53.1	4.40
Tennessee.				
Ashwood	78	20	49.0	4.46
Milan	81	24	47.2	4.44
Paris *	75	24	54.5	9.38
Texas.				
Austin *	83	34	60.3	3.94
Clark, Fort	89	33	62.6	1.70
Comfort	.....	.....	.....	3.56
Corsicana	.....	.....	.....	4.22
Huntsville *	80	31	.....	3.89
McIntosh, Fort	89	41	66.8	1.26
Midland	88	28	52.5	0.43
Ringgold, Fort	94	50	70.4	0.12
New Ulm	81	34	58.7	4.75
Silver Falls	90	19	.....	.....
Vermont.				
Brattleborough	57	— 3	32.3	2.98
Burlington	66	— 9	28.6	1.33
Charlotte *	66	—10	25.8	2.40
Dorset	66	—10	27.9	3.29
Lunenburg	50	—16	25.2	0.90
Newport *	51	—16	24.6	2.50
Post Mills Village *	52	—12	26.0	.....
Poultney	70	—11	28.0	2.75
Strafford *	50	—16	25.9	2.20
Stowe *	45	—16	20.0	2.81
Virginia.				
Accotink	72	16	42.7	6.65
Bird's Nest *	76	19	46.8	2.85
Bruington	.....	.....	.....	4.46
Dale Enterprise *	76	14	44.7	6.86
Marion *	70	16	41.0	3.48
Monroe, Fort	74	20	45.8	1.35
Snowville *	69	17	.....	.....
Summit	72	14	42.0	.....
University of Va	66	32	47.5	5.65
Variety Mills	75	16	43.5	6.16
Wytheville	70	18	42.4	5.31
Washington Territory.				
Bainbridge Island *	70	26	44.0	2.78
Pleasant Grove *	71	15	.....	0.24
Spokane, Fort	75	20	41.5	trace.
Tacoma *	62	23	43.0	3.35
Townsend, Fort	59	20	43.8	0.54
Walla Walla, Fort	77	17	46.5	trace.
West Virginia.				
Helvetia *	71	— 2	38.6	4.46
Parkersburg	76	15	40.6	4.39
Wisconsin.				
Beloit	68	2	30.5	4.60
Embarras *	55	0	28.2	3.95
Fond du Lac *	50	— 2	27.5	3.43
Madison	49	4	28.9	4.67
Manitowoc	45	10	30.6	3.62
Neillsville *	43	—19	19.4	0.50
Prairie-du-Chien	58	— 8	30.9	2.36
Wyoming.				
Bridger, Fort	50	— 7	26.0	1.18
Fred Steele, Fort	57	— 5	28.7	0.62
Laramie, Fort	65	—11	23.4	0.36
Washakie, Fort	60	—15	28.4	2.05

NOTES AND EXTRACTS.

The following is an extract from the March, 1886, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn:

The first part of the month presented no unusual features in atmospheric changes, but towards the close a low depression began to manifest itself and the barometer became quite unsteady until the 26th, when a violent storm burst over the state, producing extensive and damaging floods. The rise in the rivers was greater than ever known to occur before.

The temperature was 6° below the average and frosts were quite frequent, with occasional snows.

There was an increase in precipitation of 2.72 inches above the normal, and most of this rain fell within the last few days of the month. Several tornadoes originated in sections of the state during the storm of the 26th–31st, and considerable damage resulted therefrom.

Ice formed on the 10th and 11th all over the state, and at some places it is reported from one-fourth to one-half inch in thickness.

Light snows are reported at Trinity on the 9th and 31st; Birmingham on 10th and 31st; Springville and Russellville on 31st.

State summary.

Temperature.—Mean, 53°; highest, 89°, at Livingston, on the 25th; lowest, 18°, at Gadsden, on the 11th; range, 71°; greatest monthly range, 58°, at Gadsden nd Trinity; least monthly range, 36°, at Lafayette; mean daily range, 13°; greatest daily range, 46°, at Gadsden, on the 24th; least daily range, 0°, at Mount Willing, on the 4th, Selma, on the 13th.

Precipitation (inches).—Mean depth of rainfall, 10.05; mean daily rainfall, 0.324; greatest depth of monthly rainfall, 18.25, at Newton; least depth of monthly rainfall, 3.38, at Decatur; greatest daily rainfall average for state, 3.04, on the 30th; greatest daily local rainfall, 9.75, at Russellville, on the 29th.

Average number of days on which rain fell, 10; average number of cloudy days, 15; average number of fair days, 7; average number of clear days, 9; warmest days, 18th, 19th, 29th; coldest days, 10th and 11th.

Prevailing directions of wind, southeast and southwest.

The following is an extract from the March, 1886, "Weather Review of the Illinois Weather Service," under direction of Mr. Charles F. Mills, of the Illinois Department of Agriculture, Springfield:

The "Review" contains a general summary of the conditions which prevailed over Illinois during the month of March, 1886, based upon the reports received from the Signal Service and voluntary observers reporting to the Illinois Department of Agriculture.

The state covers such an extended area from north to south (385 miles) that it has been found advisable to divide the same and follow the judicial divisions, which include the following territory, viz., the northern division extends from 42°.30 to about 40°.31; the central division extends from about 40°.31 to about 39°; the southern division, from about 39° to 36°.51.

Atmospheric pressure.—The highest barometer reported at the twenty-six stations during the month of March was on the 2d, at twenty-two stations; on the 3d, 10th, 12th, and 25th, at one station each. The lowest barometer reported during the month was on the 7th at one station, on the 21st at one, and on the 20th at twenty-four stations; the barometer in March, 1886, reached a higher point than in any of the four preceding Marches, as well as falling below any point reached in those months.

Temperature.—The mean temperature of March, 1886, was above the average of the same month at all except eight of the stations from which reports have been received for a term of years; the mean temperature of March for the last twelve years was 37°.58, which was 0°.80 below the mean temperature of March, 1886. The mean temperatures of March, 1878, 1879, and 1882 alone were higher than that of March, 1886, and March, 1875, 1876, 1877, 1880, 1881, 1883, 1884, and 1885 were colder than March, 1886. The highest mean temperature for March during the last twelve years was 48°, 1878, and the lowest, 33°.01, 1881; the highest temperature of the month was reported on the 19th, at thirty-four stations; on the 18th, at twenty-five stations; on the 24th, at three stations; on the 17th, at two stations; and on the 15th, at one station. In the northern division of the state the highest temperature was reported on the 19th, at eighteen stations, and on the 17th and 24th, at one station, each. In the central division the highest temperature was reported on the 19th, at eleven stations; on the 18th, at ten; and on the 17th and 24th, at one station each. In the southern division the highest point reached at fifteen stations was on the 18th, at five on the 19th, and on the 15th and 24th at one station each.

From the above it will be seen that the warm wave commenced in the southern part of the state on the 18th, and, travelling north, reached the northern portion on the 19th, when the temperature began to fall.

The lowest temperature in March, 1886, was reported on the 1st, at one station; on the 2d, at eighteen stations; on the 3d, at thirty-two; on the 4th, at two; and on the 10th, at thirteen stations. In the northern division of the state the lowest temperature was reported on the 2d, at eleven stations, and on the 3d at nine and on the 4th at one. In the central division the lowest point reached was on the 1st at one station, on the 2d at six and on the 3d at fifteen. In the southern division the lowest temperature was on the 2d at one station, on the 3d at eight, on the 4th at one, and on the 10th at thirteen. The highest temperature in March, 1886, was 85°, at Bluffdale, Greene county, on the 18th, and the lowest, —7°, at Cedarville, Stephenson county, on the 2d.

Precipitation.—The precipitation in March, 1886, including melted snow, averaged 3.34 inches for the fifty-four stations reporting. This was 0.42 inch more than the average March precipitation of twelve years past. The March, 1886, rainfall was less than that of the corresponding month in but three years, viz., 1876, 1.63 inches less; 1877, 1.07 less, and 1882, 1.13 less. It was greater than that of the corresponding month in 1875, 1878, 1879, 1880, 1881, 1883, 1884, and 1885. The precipitation of March, 1886, was more than the average at seventeen of the stations from which reports have been received for a term of years, and less than the average at but five stations. Rain fell very generally over the state on the 5th, 7th, 11th, 12th, 20th, 21st, 28th, 29th, 30th, and 31st, and in the southern division of the state on the 26th, and 27th. Local rains occurred in various portions of the state, March 1st, 6th, 8th, 9th, 10th, 13th, 14th, 17th, 18th, 19th, 22d, 24th, and 25th. No rain was reported from any part of the state on the 2d, 3d, 4th, 15th, 16th, and 23d. The least precipitation at any station in March, 1886, was 1.64 inches, at Oquawka, Henderson county. The greatest precipitation of the month was 16.23 inches, at Elizabethtown, Hardin county.

The snowfall of the month was much greater than that for March, 1885, the average for the entire state being 7.72 inches more than for March, 1885. By far the heaviest snow storm of the month occurred on the 31st, it being generally reported as the heaviest ever recorded so late in the season. Had the ground been frozen and the temperature of the air below freezing point, this would have been one of the deepest snows of the season, but it melted so fast that only a comparatively small quantity lay on the ground over night. This storm was very general throughout the state.

Wind.—The prevailing direction of the wind was northwest.

The following meteorological summary and accompanying remarks are from the March, 1886, report of the "Indiana Weather Service," under direction of Prof. W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	77.0	5.0	36.3	2.33
Central counties	76.0	10.0	38.4	2.80
Southern counties	80.0	13.0	42.2	2.37
State	80.0	5.0	39.0	2.50

Weather and precipitation.—At eight stations, averaged, 8.0 days were clear, 9.2 fair, 13.8 cloudy, and 0.01 or more precipitation fell on 12.1. The first third of the month was cold, with general snows in the latter half; the second, warmer, commencing with the general rain of the 12th and light snows in the first half, fair, very warm weather following, culminating in thunder-storms on the 18th and 19th at one or two northern stations and heavy rain and thunder-storms at most stations on the 20th; and the third, moderate, with gradually increasing cloudiness and rain and snow, ending with the general and heavy rain and snow of the 30th and 31st. Thunder-storms also occurred at some central and southern stations on the 28th and 29th.

Temperature.—The first five days were cold, and the 18th and 19th remarkably warm. At Spiceland, a very good representative station, the temperature was below freezing on nineteen days and above 50° on ten. The mean for the month was 1°.9 above normal at Spiceland; 0°.1 below at Indianapolis; 3°.1 above at Connersville; 0°.8 below at Mauzy; 4°.6 above at Sunman; 4°.4 above at Worthington; 0°.8 above at Vevay; 0°.5 above at Blue Lick; and for the state 2°.9 higher than in 1883; 1°.9 lower than in 1884; 7°.8 higher than in 1885; and 2°.2 higher than the normal from four years' observations. Normals from short periods are probably too low, the last four or five seasons having been unusually cold compared with previous longer periods. At Spiceland the warmest March (47°.0) was in 1871, the coldest (27°.0) in 1856, the highest temperature (77°) in 1875 and the lowest (—9°) in 1857. The highest station mean was 44°.5, at Marengo, and lowest, 34°.5, at Angola. Our southern station, Degonia, averaged 9°.9 higher than La Grange, the one furthest north. Highest reading, 80°, at Marengo; lowest, 5°, at Angola; average station range, 59°.0; greatest, 67°, at Angola; least, 31°, at North Liberty.

Precipitation (inches).—The precipitation was somewhat less than normal and well distributed through the month and over the state, varying from an aggregate of 14.85 (at twenty-six stations) on the 20th to 0.01 or less on the 2d, 3d, 4th, 15th, 16th, 23d, 24th, and from 3.97 at Terre Haute to 1.50 at Miami. The snowfall ranged from 9.5 at North Liberty and Connersville to 0.2 at Vevay, several stations not reporting. The principal precipitation fell on the 12th (aggregate, 8.33), 20th (14.85), 29th (9.67), 30th (14.52), 31st (11.73). The snowfall was about normal. At Spiceland the precipitation was greatest in 1876 (7.40) and least in 1885 (0.70), snowfall greatest in 1881 (18.0) and least in 1871, 1878, and 1882 (not measurable).

The following meteorological summary and accompanying remarks are from the March, 1886, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	77.0	10.0	37.2	3.45
Central counties	77.0	10.0	38.7	4.53
Southern counties	80.0	15.0	42.4	3.29
State	80.0	10.0	39.4	3.76

Temperature.—The mean temperature of the state for March, 1886, was 2°.7 above the mean of the month for the past four years; 0°.1 below the mean of fifteen years at Indianapolis; 0°.9 below the mean of twenty-six years at Logansport; 3°.4 below the mean of twenty-one years at Vevay; 3°.0 above the mean of thirty years at Spiceland; 3°.9 above the mean of six years at Mauzy; 2°.4 below the mean of eight years at Blue Lick; 0°.3 above the mean of four years at Worthington; and 3°.3 above the mean of seven

years at this station. The temperature has been normal, since 40° may be taken as the normal temperature for March.

Precipitation (inches).—The mean precipitation was 0.23 above the mean of the past four years; 1.45 below the mean of fifteen years at Indianapolis; 1.09 below the mean of twenty-six years at Logansport; 1.67 below the mean of twenty-one years at Vevay; 1.50 below the mean of twenty-seven years at Spiceland; 1.0 below the mean of six years at Mauzy; 0.29 below the mean of five years at Blue Lick; 0.42 above the mean of four years at Worthington; 0.03 below the mean of seven years at this station; and about 1.50 below the normal amount for March.

The following is an extract from the March, 1886, report of Prof. F. H. Snow, of the University of Kansas, from observations made at Lawrence, Kansas:

The temperature of the month was slightly below the average, and the rainfall about 25 per cent. below the average; the cloudiness of the first and last weeks was excessive, giving a high mean for the month. The season is later than usual.

Temperature.—The mean temperature, 40°.04, is 1°.31 below the March average; the highest temperature, 79°.0, occurred on the 17th and 24th, and the lowest, 11°.0: on the 10th, giving a range of 68°.0.

Precipitation.—The total precipitation, including melted snow, was 1.63 inches, which is 0.50 inch below the March average; rain or snow, in measurable quantities, fell on ten days; the total snowfall being 4 inches. The entire precipitation for the first three months of 1886, 4.47 inches, is 0.19 inch below the average for the same months of the preceding eighteen years.

State of the sky.—The mean cloudiness of the month was 55.05 per cent., being 15 per cent. cloudier than usual; number of clear days, 12; half clear, 5; cloudy, 14; there were five entirely clear days and eight entirely cloudy days.

Wind.—The prevailing direction of the wind was northwest and the total movement 13,900 miles, which is 501 miles below the March average.

Relative humidity for the month 67.7 per cent., the extreme being 100 per cent. on the 4th, and 18 per cent. on the 24th.

The following is an extract from the "Kansas Weather Observer," for March, 1886, under direction of John H. Wolfe, of Wellington:

Reports for the month were received from twelve observers.

The average monthly mean temperature, covering the area of the state, was 39°.9, which may be termed as about the normal for March. The coldest period was noted on the 9th and 10th, when the temperature reached the minimum for the month, 10°, or a range of from 2° to 15°, as noted from the various stations; the maximum temperature, 79°, occurred on the 18th, which was found to register nearly even over the state.

The average precipitation for the state was 1.63 inches, which is slightly below the normal; the total snowfall was 8.0 inches over the northwest portion and 2.0 inches towards the southeast portion of the state. The greatest precipitation, 3.50 inches, occurred at Westmoreland; and Salina, a station in close proximity, reports the least, 0.07 inch.

At the close of the month the season was delayed fifteen days by the continuous low temperature and cold north winds.

High winds were below the average.

The following is an extract from the March, 1886, report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Carleton College, Northfield:

The average mean temperature of Minnesota for March, as deduced from reports received from the several stations of the Minnesota Weather Service, is 26°.8; this is 13°.7 warmer than February, and 2°.6 warmer than March, 1885. The mean for the month was very near the normal in the southeastern part of the state, La Crosse reporting a mean for the month of 31°.0, only 0°.2 below the average of the last fourteen years, and Duluth, in the east, on Lake Superior, the same. As in February, there has been a decided uniformity in the mean between the northern and southern parts of the state; this is caused by the fact that the month has been much warmer than the average in the Red River Valley, Moorhead being 5° warmer than the average March, while, as before stated, the southern and southeastern sections were slightly below the mean for that month. The weather has been unusually pleasant for an initial spring month with, especially in the west, many clear, bright, and mild days. All the stations, with but two exceptions, have reported zero readings on one or two days, but these occurred during calm weather, as is usually the case, and therefore occasioned no hardship.

During the first half of the month there were many calm days, or days of light wind, but the frequent rapid changes in the atmospheric pressure, or weight of the air, during the latter half of the month caused much windy weather and occasional gales. Bird Island, as usual, had the greatest total wind movement, 10,565 miles, and Red Wing, the least, 4,083 miles. At Grand Forks, on the 24th, during the passage of a storm-centre, with sharp contrasts of pressure, the wind for a short time had a velocity of sixty miles per hour. Bird Island reported forty miles per hour on the 12th, and forty-two miles per hour on the 21st.

The precipitation, while generally small in amount, was somewhat greater than March, 1885, being an average of 1.09 inches for 1886 and 0.51 inch for 1885. Largest amounts recorded were, Northfield, 2.06 inches; Albert Lea, 2 inches; and Spring Valley, 2.14 inches. Least amounts were, Moorhead, 0.14 inch, and Morris only 0.02 inch. Two heavy snow storms visited the southeastern part of the state, the first occurring on the 20th with high northeast winds, and falling to a depth of 11.2 inches at Northfield, 5.9 inches at Red Wing, and 2.6 inches at Mankato. This storm, by drifting the moist snow, caused slight delay to the movement of trains on the Minnesota and Northwestern and the Southern Minnesota division of the Chicago, Milwaukee, and Saint Paul Railway. The second occurred on the 28th and 29th, and was lighter than the first, the average depth of snow not being over three or four inches, and melting rapidly. On the 19th snow fell to the depth of six inches at Grand Forks, but it soon disappeared. The first thunder-storms of the season were on the 17th. The ice was only partially out of the larger streams and rivers at the end of the month, and still remains solid in the lakes.

Seeding of spring grain had not generally begun at the end of the month. During the warmer periods there was some harrowing and other preparatory work, and in some cases a limited amount of grain was sown in the western part of the state and in Dakota. There being but little snow on the ground during the last decade of the month, seeding would have become general in those districts had it not been prevented by the frozen condition of the ground, caused by the cold weather, which, beginning on the 26th, continued to the end of the month. Cold weather and the unmelted snow arising from the heavy snows of January have prevented seeding in the southeastern part of the state, but the conditions of the land and of the weather are of such a favorable nature that the sowing of spring crops will probably become general during the first half of April.

The month has been more favorable than usual for logging operations, which were interfered with somewhat by the warm mid-day sun melting and softening up the roads, yet the hard freezes at night, re-enforced by occasional light falls of snow, have kept the roads in fair condition and enabled hauling and banking operations to be continued almost to the end of the month, thus increasing the cut materially, and insuring a much larger supply of logs for the season's supply than was anticipated at the very unpropitious commencement of the season. It is not probable, however, that the supply for 1886 will be excessive and the prospects for that industry are very favorable indeed. On the headwaters of the Mississippi, since September, 1885, there has been a decided deficiency in the amount of rain and snowfall, and heavy rains will be needed during April and May to insure the successful arrival of the drives at the mills.

The following is an extract from the March, 1886, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Washington University, Saint Louis:

The month of March, 1886, has been normal in temperature, with a slight deficiency in precipitation. The one peculiarity of the month has been the fact that a somewhat unusual amount of precipitation occurred as snow. The rain and melted snow was distributed throughout the month, as follows: first decade, 0.45 inch; second decade, 0.50 inch; and third decade, 2.35 inches. A little over half (1.19) the precipitation of the last decade occurred in the form of snow on the 30th and 31st. This snow was about 5 inches deep, and seems to have been much lighter to the west of Saint Louis.

The lowest temperature of the month was 24°.5, on the 3d, and the highest, 79°.8, on the 18th and 19th. During the month the temperature fell to or below the freezing point on seven days, only one of which was later than the 15th. The average temperatures of the decades were 35°, 52°, and 49°.

In the state the precipitation has been greatest (from 3 to 3.50 inches of water) east of a line drawn from the mouth of the Missouri River southward to the west of Iron Mountain, and to the mouth of the Ohio. Over the rest of the state, excepting in small regions in the northern part of the state, and in a narrow belt surrounding the area of maximum fall, the precipitation has been between one and two inches.

The lowest temperatures reported, were: 6°, at Oregon; 8°.8, at Leavenworth, and 12°, at Kirksville; the highest, 86°, at Miami, and 85°, at Steelville.

The following is an extract from the March, 1886, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

The most striking feature of the month has been the unprecedented snowfall of 25.3 inches, the normal amount for March being 4.6 inches, and the greatest heretofore recorded by this service being 12.1 inches in March, 1881; the greatest snowfall for any month was in February, 1881, when it reached 14.4 inches, a trifle more than half of what has fallen the past month. The precipitation, number of days of precipitation, and proportion of cloudy days have been correspondingly large.

The temperature has been about 5° below the normal, being the coldest March, except that of 1881, for the past nine years.

The average precipitation for the different sections of the state is as follows: northeast section (two stations), 2.20 inches; north middle (one station), 1.88 inches; west (one station), 1.51 inches; south middle (two stations), 0.98 inch; southeast (covering essentially what has heretofore been the "whole state," as far as reporting), 0.70 inch; state average by sections, 1.45 inches.

The following is an extract from the March, 1886, "Bulletin of the New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, Rhode Island:

Reports for the month were received from one hundred and forty-seven observers.

General conditions.—The month was nearly normal in temperature, with a deficiency in precipitation. The conditions may be briefly described in seven divisions: First, 1st–7th; fair and cold, with very high winds on the opening

days and a few snow squalls. Second, 8–9th; light snows attending the passage of a cyclonic depression which moved southeasterly over the southern portion of New England. Third, 10–11th; fair and cold. Fourth, 13–16th; cloudy, with light snows and rains attending the passage of two depressions from the lakes easterly on the 13th and 16th. Fifth, 17–19th; fair, with average temperature. Sixth, 20–22d; heavy rains or snows, high winds, and thunder-storms, attending the passage of a severe storm, more particularly described below. Seventh, 23d–31st; cloudy and warm, culminating in general rains at the close of the month, which caused freshets in the northern rivers. Two cyclonic depressions occurred in this period, the former moving far north of the district on the 25th, the latter from the Southern States to the Lake region on the 31st.

Special features.—The following deserve mention:

1. *The violent winds of the 1st–3d*: These were a continuation of the gales of February 25–28th, and closed a period of remarkable severity. Their cause, as explained in the February "Bulletin," was the steep barometric gradient following the passage of a cyclonic depression of unusual depth. The extreme cold which prevailed at the same time added to the discomfort. The minimum temperature of the month, as well as the maximum wind velocities, occurred at many stations during this period.

2. *The storm of the 20th–22d*: A depression moved from Illinois to the Lakes on the 20th, the pressure diminishing to 29.1 inches. On the 21st an auxiliary depression formed in Delaware, joining the former off the Maine coast on the 22d. The rain was heavy and the winds very high.

3. *Thunder-storms*: Two thunder-storms occurred in connection with the depression just described. On the 19th, at Setauket, lightning, with hail, occurred at 5 p. m.; the storm reached New London about midnight. It was reported at many stations in Connecticut, but was most severe at Bristol, Farmington, Middletown, Waterbury, and Watertown, the lightning striking buildings at all these towns, and causing loss of life at the last named. At this time the storm-centre was distant 1,000 miles westward. Forty-eight hours later the second thunder-storm occurred. Lightning was noted at Deerfield on the 21st at 7.30 p. m., at many Massachusetts stations near midnight, and at Belfast on the 22d at 6 a. m. The storm was severe near Boston, the greatest damage reported having been done at Woburn at 12.30 a. m., where the water mains were shattered. At this time the auxiliary depression was passing in the immediate vicinity, and the primary depression was about 300 miles northwestward. The barograph at Blue Hill observatory shows marked fluctuations. Thunder and lightning were also noted on the 30th and 31st at a few stations. At Setauket on the 31st, hail and rain, with thunder and lightning, occurred at 9.30 p. m.

Advance of the season.—The winter has been characterized by less snow than usual. At the close of the month the frost was nearly out of the ground and no snow remained in the southern portion, and at many places in the northern portion. At Gardiner twenty-two inches of snow still remained.

Miscellaneous.—The winter just passed has been noteworthy for the number of ice storms and the resulting damage to trees. The ice storms of January 28th and February 10th were widespread. On the 21st of March a third storm was experienced at Princeton, the ice forming to a thickness of two inches on the trees.

The verification of weather signals at New Haven was 77.4 for temperature, and 80.7 for weather; at fourteen other stations reporting to the secretary, 90.2 for temperature, and 90.5 for weather.

The following summary is made from reports furnished by Prof. B. F. Thomas, of the Ohio State University, Columbus, Ohio, director of the "Ohio Meteorological Bureau," in advance of the regular monthly report:

State summary.

Temperature.—Mean, 38°.5; highest, 79°.5, at Portsmouth, on the 19th; lowest, 3°.0, at Levering, on the 2d; monthly range, 76°.5; mean daily range, 18°.3; greatest daily range, 46°.5, at Logan, on the 18th; least daily range, 1°.0, at Granville, on the 27th.

Average monthly precipitation, 2.73 inches; greatest rainfall, 5.16 inches, at Marietta; least rainfall, 0.81 inch, at Oberlin.

Average number of days on which rain or snow fell, 13.7; clear days, 6.5; fair days, 11.4; cloudy days, 13.1.

Prevailing direction of the wind, southwest.

The following is an extract from the "Tennessee State Board of Health Bulletin," for March, 1886, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The summary is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

The principal features for March were the excessive rainfall of the last week of the month and the absence of the usual high winds.

The mean temperature for the month was 47°.16, 4°.59 above that for March of last year and 1°.84 below that for March of the year previous. The highest temperature, recorded on the 18th, was 81°, 3° above the maximum of March of last year and 1° above that of March, 1884. The lowest temperature, 14°, was recorded about the 10th and 11th, and was, respectively, 9° and 4° above the minima recorded in March, 1885 and 1884. The mean of maximum temperatures was 76°.67, 4°.04 above the mean of March of last year, and 1°.67 above that of the corresponding period in 1884. The mean of minimum temperatures was 22°.42, 7°.09 and 1°.02 above the respective means of March, 1885 and 1884.

The mean precipitation was 6.48 inches, 4.14 inches greater than that for the corresponding period last year, and 1.42 inches less than the mean for March, 1884. The eastern division received a very large proportion of this amount, the average fall in that section being 9.43 inches, or more than one-half of the whole amount in the state. The middle division received about five and three-fourths inches, while the western division received only three and one-half inches. The rainfall, from the 26th to 30th, inclusive, was almost continuous, and was very heavy on the 29th and 30th, especially in the eastern division, making a daily average for the entire state of 1.21 inches for the former and 1.68 inches for the latter day. The greatest local daily rainfall was 5.95 inches, at Chattanooga, on the 30th. On that day the fall at Knoxville was 5.56 inches; Andersonville, 5.43 inches; Careyville, 4.40 inches; Parksville, 4.09 inches; and Grief and Fostoria each 4.00 inches. This rainfall, following immediately the heavy rains of the few days previous, caused almost unprecedented floods in the Tennessee River and its tributaries, and the consequent destruction of much valuable property along their banks. Much greater loss was averted by the excellent system of river and flood warnings established a few years ago by the Signal Service.

The rains of the above-mentioned dates, together with those of the 12th and 20th, were general. There were six days reported without rain or snow: 2d, 3d, 16th, 17th, 23d, 24th.

The snowfall during the month was light, the greatest depth reported being 1.34 inches, at Jonesborough. Snow fell on the 7th, 8th, 9th, 10th, 11th, 12th, 13th, 20th, 21st, 30th, and 31st. The snows on the 9th and 10th were reported from most of the stations in the state; that of the 31st was general, and was the heaviest fall during the month; the others were generally very light.

The verification of weather signals for all stations was 86.4 per cent. for temperature and 79.4 per cent. for weather.

State summary.

Temperature.—Mean, 47°.2; highest, 81°.0, on the 18th, at Milan and Memphis; lowest, 14°.0, on the 11th, at Farmingdale; range, 67°.0; mean monthly range, 54°.2; greatest monthly range, 60°.0, at Farmingdale and Hohenwald; least monthly range, 44°.0, at Fostoria; mean daily range, 15°.1; greatest daily range, 45°.0, on the 19th, at Rogersville; least daily range, 1°.0, on the 1st, at Trenton, on the 28th, at Lexington, and on the 29th, at Howell; mean of maximum, 76°.7; mean of minimum, 22°.4.

Precipitation (inches).—Mean depth, 6.48; mean daily, 0.209; greatest, 12.77, at Chattanooga; least, 2.95, at Huntingdon; greatest local daily, 5.95, on the 30th, at Chattanooga; days of greatest, 20th, 26th, 27th, 29th, 30th; day of greatest, 30th.

Average number of days on which rain or snow fell, 11; average number of clear days, 7; fair days, 10.6; cloudy days, 13.4.

Mean depth of snowfall, 0.15 inch; greatest depth of snowfall, 1.34 inches, at Jonesborough.

Days without precipitation, 2d, 3d, 16th, 17th, 23d, 24th; warmest days, 18th, 19th; coldest days, 10th, 11th.

Prevailing wind, southwest.

The following additional remarks in reference to the meteor observed on January 16, 1886, are furnished by Rev. John G. Hagen, S. J., voluntary observer at the College of the Sacred Heart, Prairie du Chien, Wisconsin:

From the records of the MONTHLY WEATHER REVIEW from January, 1886, of the meteor of January 16th, the following path may be traced: After correcting the date of observation at Manchester, Iowa, from the 15th to 16th, and that at Bancroft, Iowa, from the 17th to 16th, and the hour of observation at Dubuque from 10.50 to 9.50 p. m., we have seven reports of the phenomenon, of which those from Prairie du Chien, Wisconsin, Manchester and Dubuque, Iowa, and Mankato, Minnesota, are the most important. If the azimuth lines of first and last appearance are drawn on a map from the three points, Prairie du Chien, Mankato, and Bancroft, it becomes evident that the meteor moved in the direction from Emmettsburg, Palo Alto county, towards Dubuque. If again the azimuth lines of the three explosions are drawn from Prairie du Chien, their intersection with the path of the meteor will exactly represent the reports from Manchester and West Union, Iowa; the third explosion alone was seen in Dubuque, about 20° from the zenith, which corresponds to a horizontal distance of about eleven miles, judging from the approximate height of the meteor. If, with a radius of eleven miles, a circle be drawn around Dubuque it is to intersect the path of the meteor in an eastern azimuth of 20° from Prairie du Chien; this place is northwest of Dubuque, between Pin Oak and Richardsville, Iowa. The second explosion must have taken place near Edgewood, Clayton county, Iowa, and the first at the boundaries between Bremer and Butler counties, Iowa. The apparent altitude at the moment of disappearance was 40°, as seen from Prairie du Chien, and 44°, as seen from Manchester, which correspond to the vertical heights of 29.7 and 30.7 miles, respectively, or to 30 miles as a mean value. At the time of the second explosion the meteor had reached its greatest elevation of 58°, as seen from Prairie du Chien, which corresponds to a vertical height of forty-five miles above Edgewood. The inclination of the meteoric orbit to the horizon between this place and Dubuque was therefore 27°. Had this remained the same, the angle at which the meteor was first seen at Dubuque could not be less than 30°, while the report gives it as 20°. The meteor therefore approached the horizon like a projectile, and may have struck it in the northern parts of Jo Daviess or Stephenson counties, Illinois. The vertical elevations of 20°

observed at Mankato, and of 60° at Manchester, can not form the basis of a computation, as no azimuth was given for these phases of the phenomenon, although they can well be brought into accordance with the path above described. One feature of the phenomenon is worthy of special attention, as it may throw some light on the nature of the upper parts of the atmosphere. The interval of time between light and sound was estimated at 2.2 minutes at Prairie du Chien and "a few seconds" at Manchester; this latter expression can not be taken literally, as the nearest approach of the meteor to Manchester was not below forty-five miles air line. The nearest distance from Prairie du Chien was about fifty miles, which would be traversed by sound in four minutes at least in the lower parts of the atmosphere; the actual time observed was only half this amount. The evident conclusion is that sound travels with much greater velocity in the upper regions of our atmosphere than near the surface of the earth; in no other way could the facts be reconciled that the meteor passed between Prairie du Chien and Manchester, forty miles distance from each other at the respective altitudes of 50° and 60°, and that the report of the explosion was heard in 2.2 minutes in one and "a few seconds" in the other place.

The following directions for setting up minimum thermometers and reuniting detached columns of alcohol are given for the information of those interested:

The brass support for the minimum thermometer should be screwed into the upper part of the board, and the holes so arranged as to slightly incline the left end of the support downward. The top of the thermometer should be fastened by the small brass screw upon the support and the lower end dropped into the notch to the left. The instrument is made ready for observation by raising the bulb-end until the index glides down to the top of the column, and then lowering it into the notch again.

To reunite the alcohol when the detached portion is only a few degrees in length, the most convenient way is to take the thermometer about vertically in one hand, with the bulb down, and strike the brass edge sharply against a block of wood held in the other. A continued jarring in this way soon causes the alcohol to run down. The larger the bore of the thermometer the better this method succeeds, but it can be made to work even in the case of narrow bore thermometers.

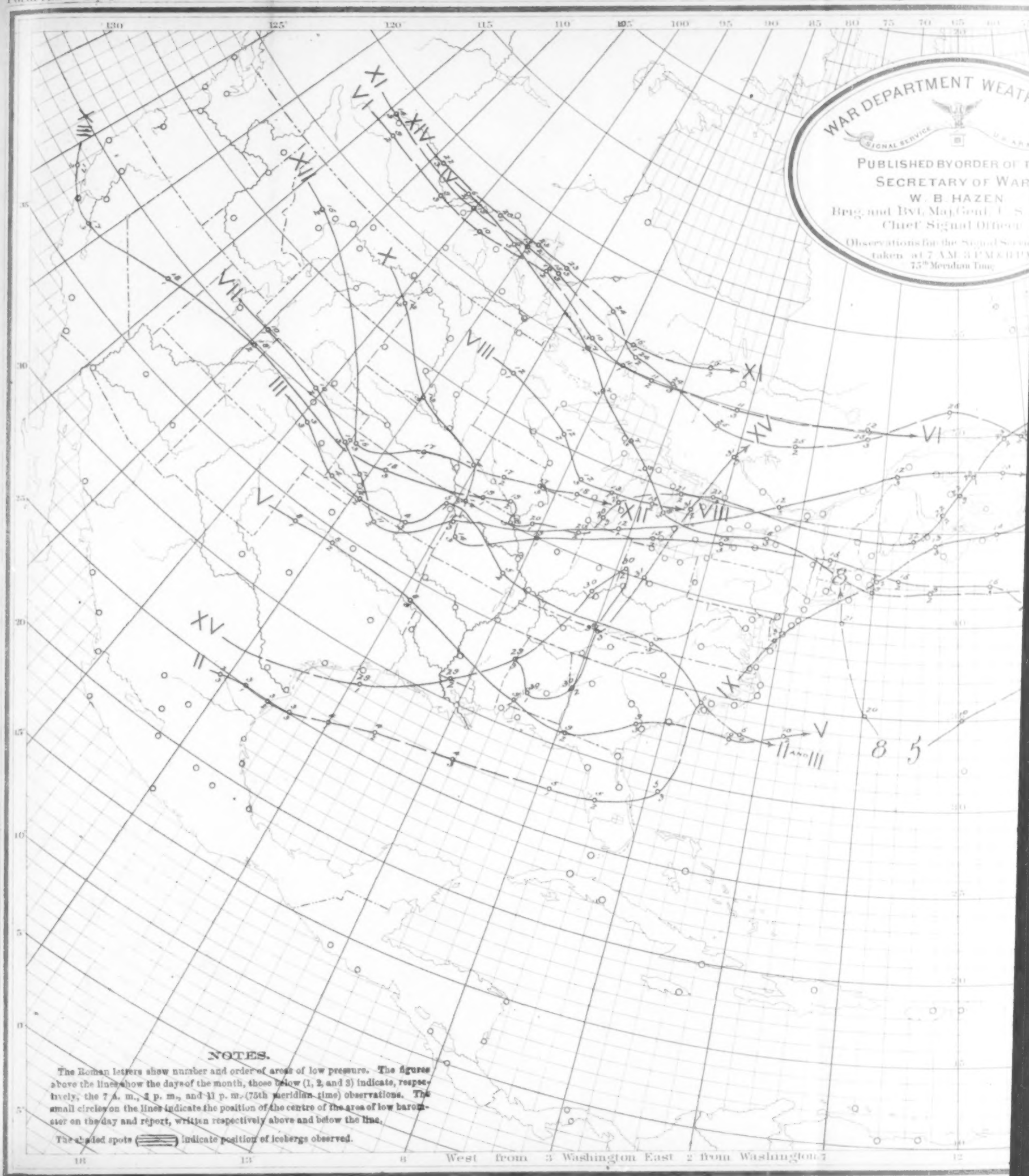
Another method of uniting the detached column is to heat up the bulb in warm water until the column is driven into the enlargement at the top of the tube and the main column joins on to it. The thermometer is allowed to cool down while it is kept in a vertical position.

When there is much of the alcohol detached and the thermometer is heated up, it sometimes occurs that before joining on to the alcohol in the enlargement a separation will take place in the main column of the alcohol, or that bubbles will form in the bulb. The best way to do in this case is to swing the thermometer. For this purpose a loop of several strands of copper wire should be made in the eye at the top of the brass scale, and to this a stout cord should be fastened. If the cord is put into the eye of the scale, without the loop, it may become cut through in whirling, and the thermometer is apt to fly off and break. The length of cord from the loop to the hand should be about eighteen inches. To make the column join in a thermometer with a narrow bore it must in some cases be whirled with very great rapidity. The detached column works down gradually as the whirling is continued. In the case of very refractory thermometers, instead of a continued uniform velocity of rotation it is sometimes found that the column runs down more readily to whirl by jerks, so that the thermometer has a very high velocity for only a part of a revolution.

Sometimes in joining on a detached column, in order to save trouble in fitting on a cord or heating up water, the thermometer is taken in the hand about the middle of the scale and swung in an arc of a circle. To swing a narrow bore thermometer in this way with sufficient force to drive down the alcohol it must be grasped so firmly that there is danger of breaking the stem.

Form 106 C 1884

Chart I. Tracks of Areas of Low P



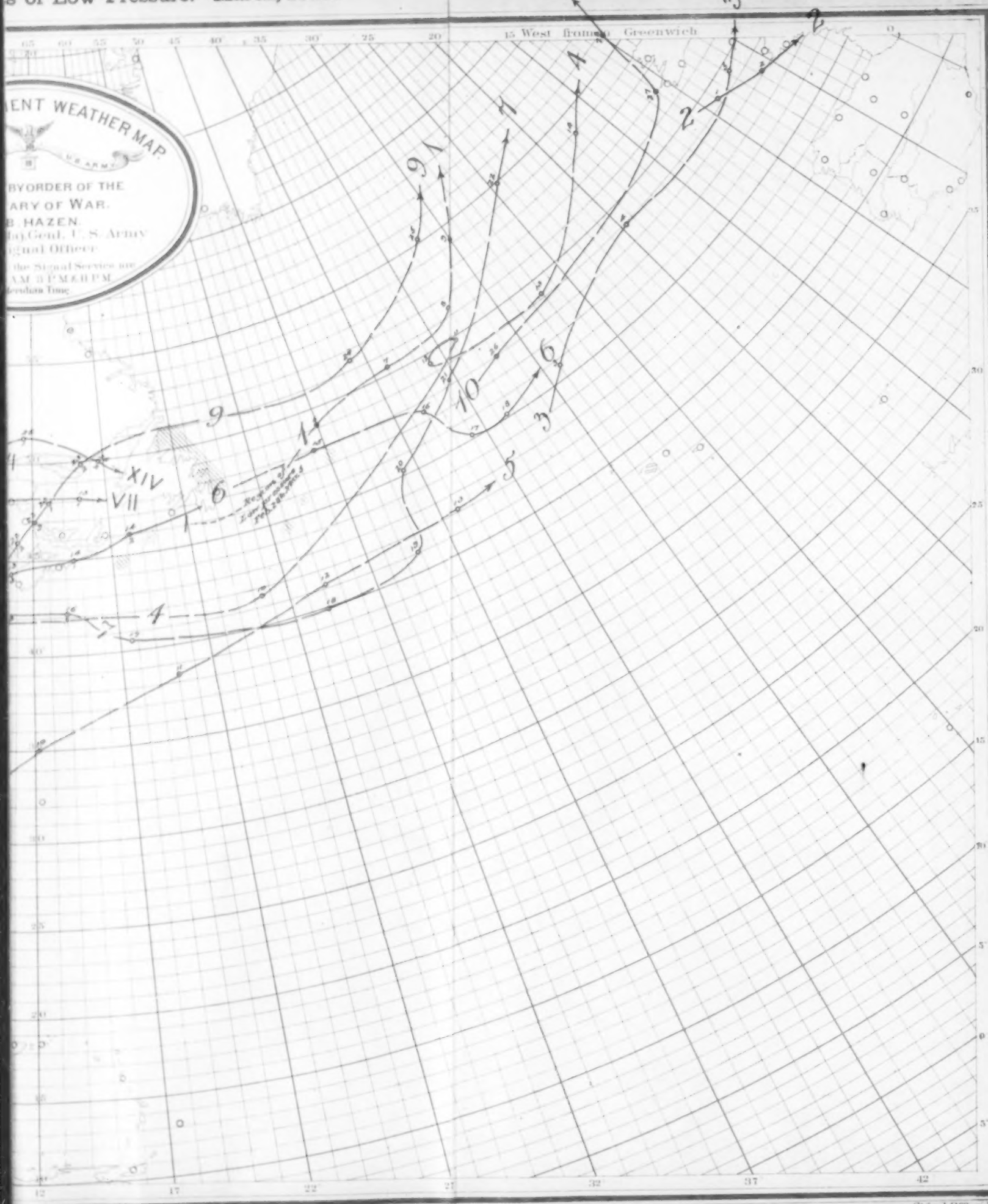
NOTES.

The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 A. m., 3 p. m., and 11 p. m. (75th meridian time) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

The shaded spots (▬) indicate position of icebergs observed.

West from 3 Washington East 2 from Washington 4

s of Low Pressure. March, 1886.



Signal Officer

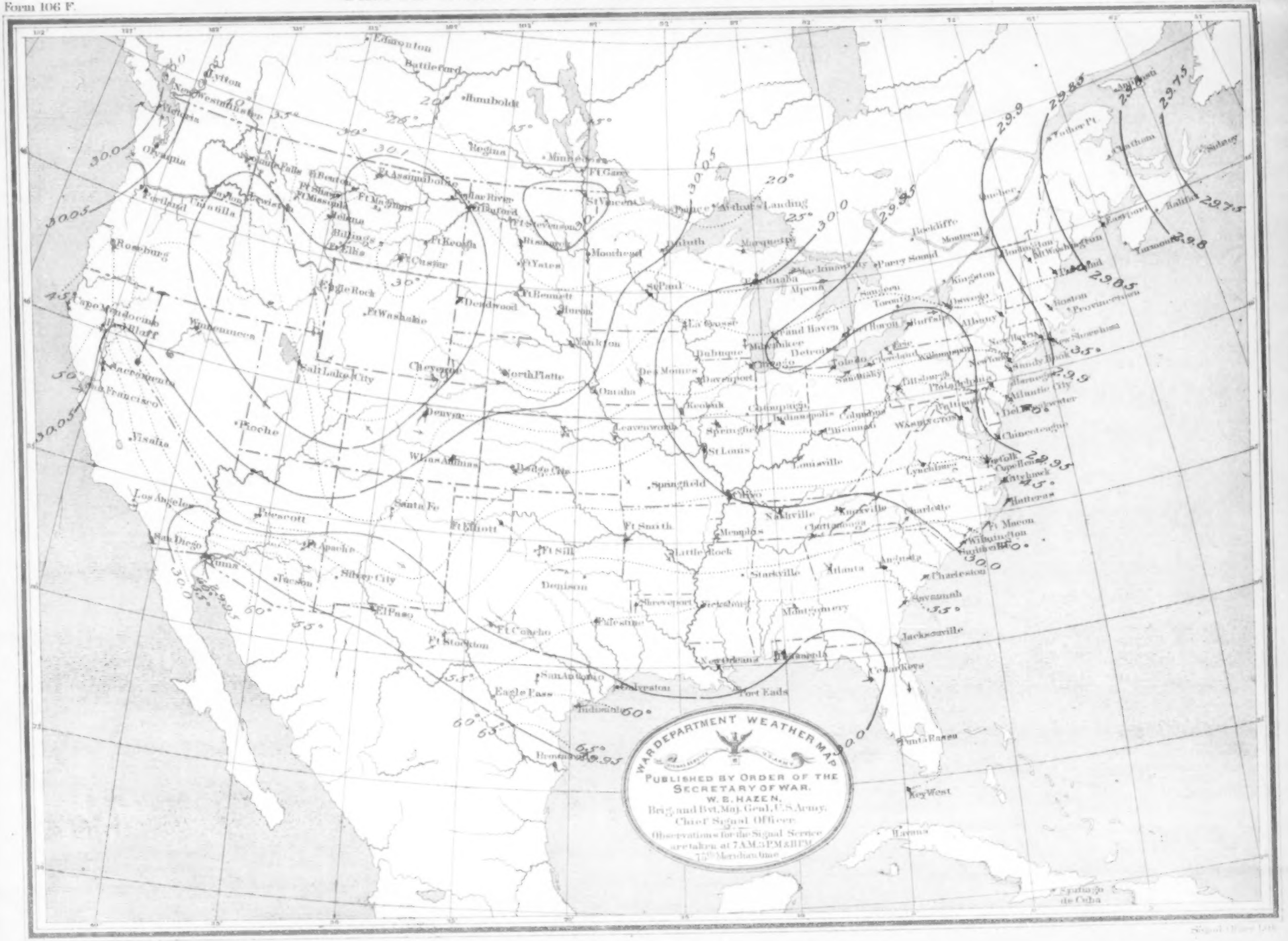
nal Office Lith.

Chart II. Isobars, Isotherms, and Winds. March, 1886.

Form 106 F.

Form 106 F.

Chart II. Isobars, Isotherms, and Winds. March, 1886.

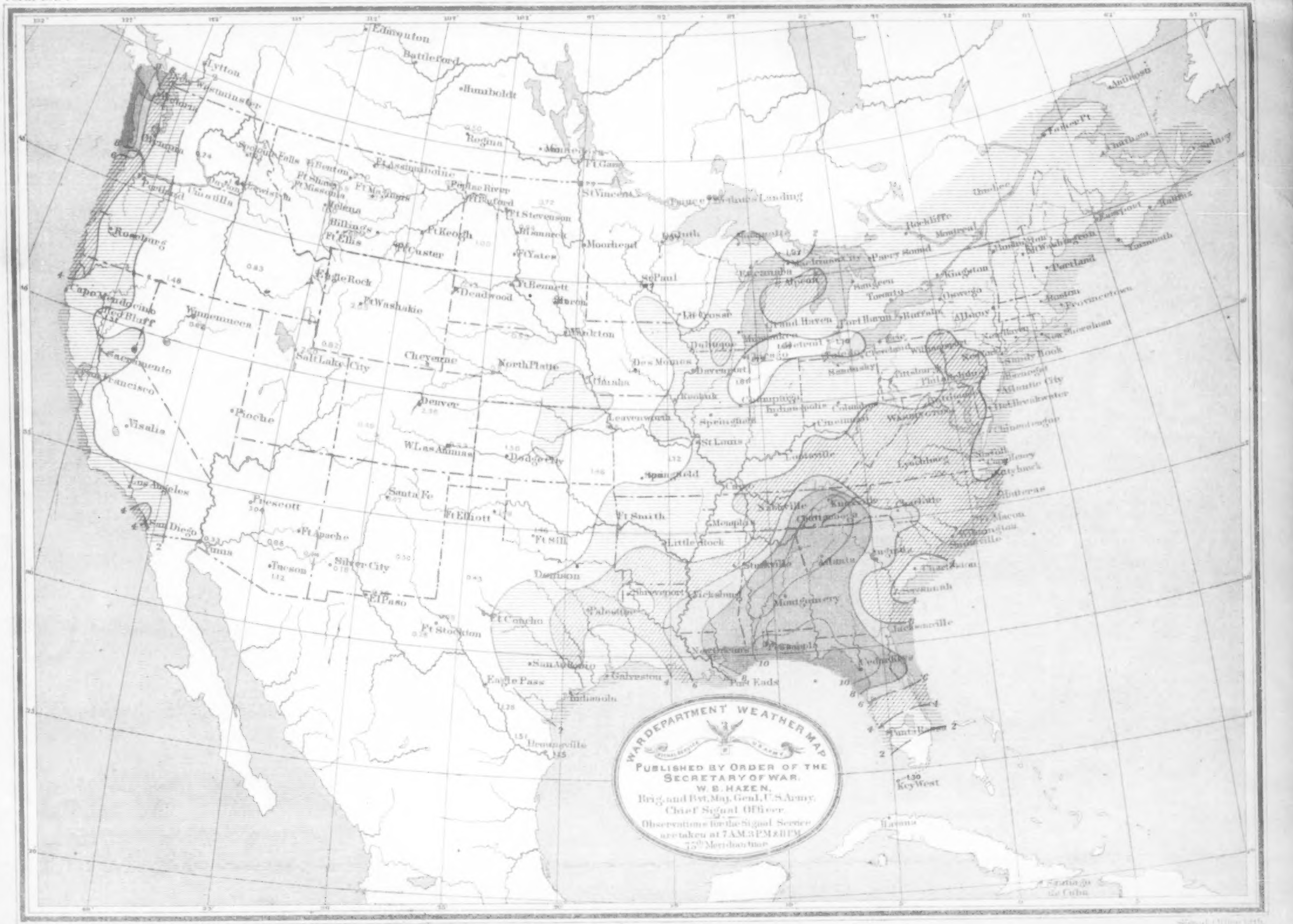


Form 106 F.

Chart III. Precipitation, March, 1886.

Form 106 F.

Chart III. Precipitation, March, 1886.



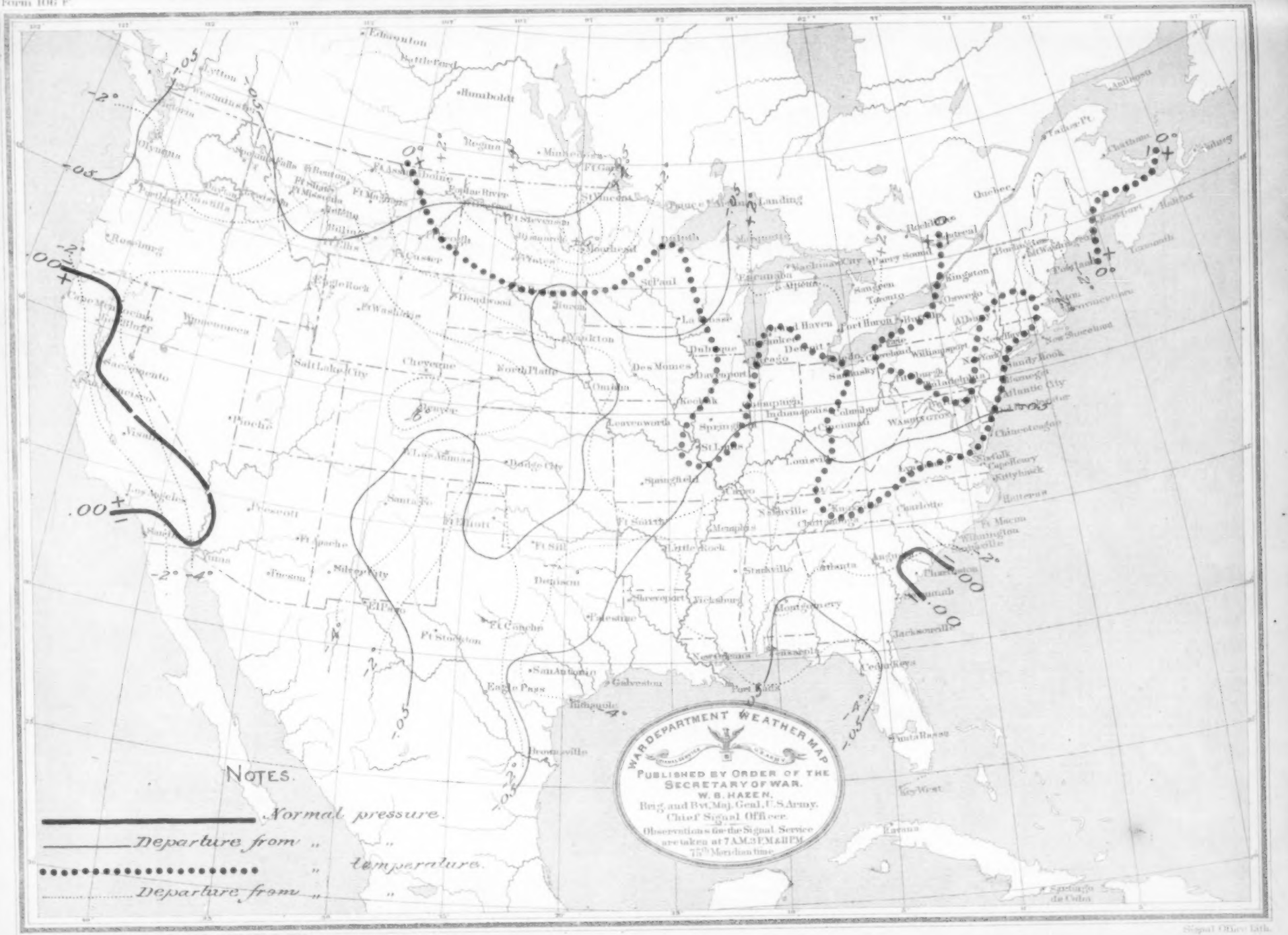
Signal Office Lith.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. March, 1886.

Form 106 F

Form 106 F

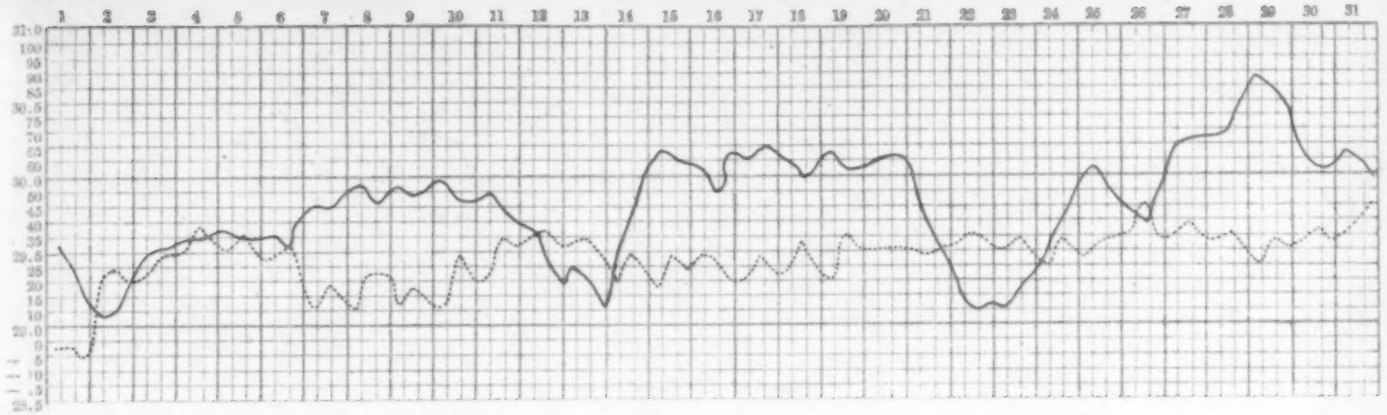
Chart IV. Departures from Normal Atmospheric Pressure and Temperature. March, 1886.



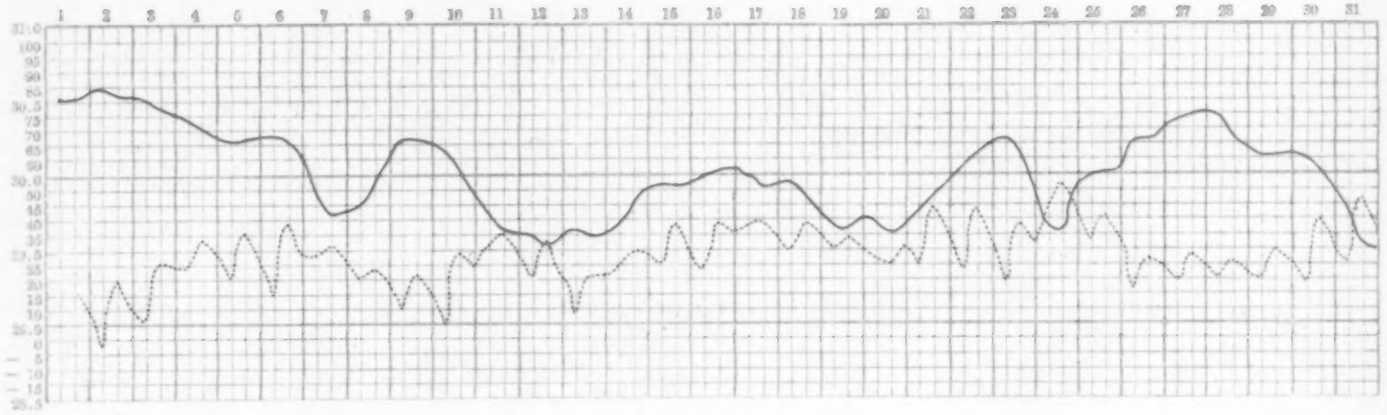
Signal Office Lith.

Chart V. Pressure (———) and Temperature (.....) Curves. March, 1886.

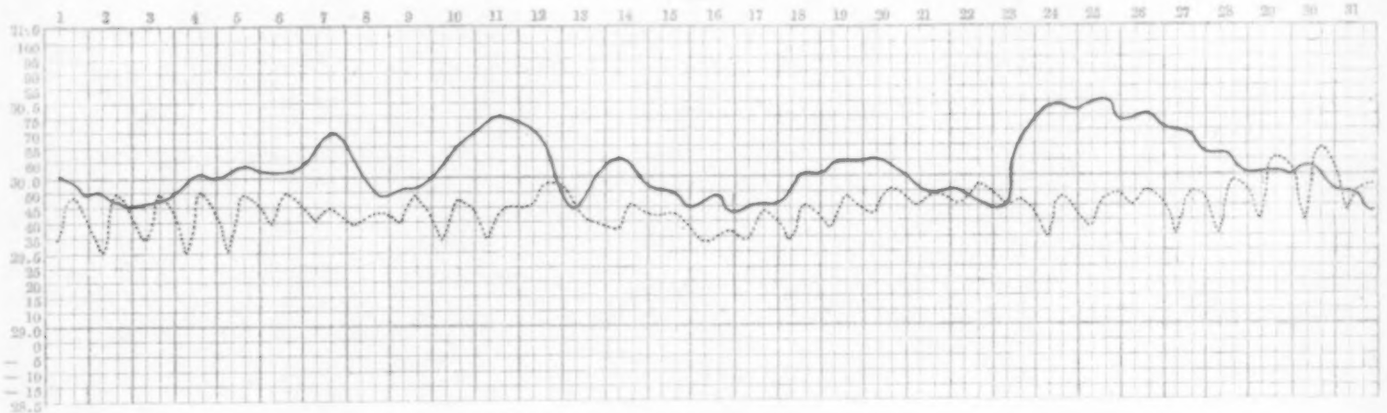
EASTPORT, ME.



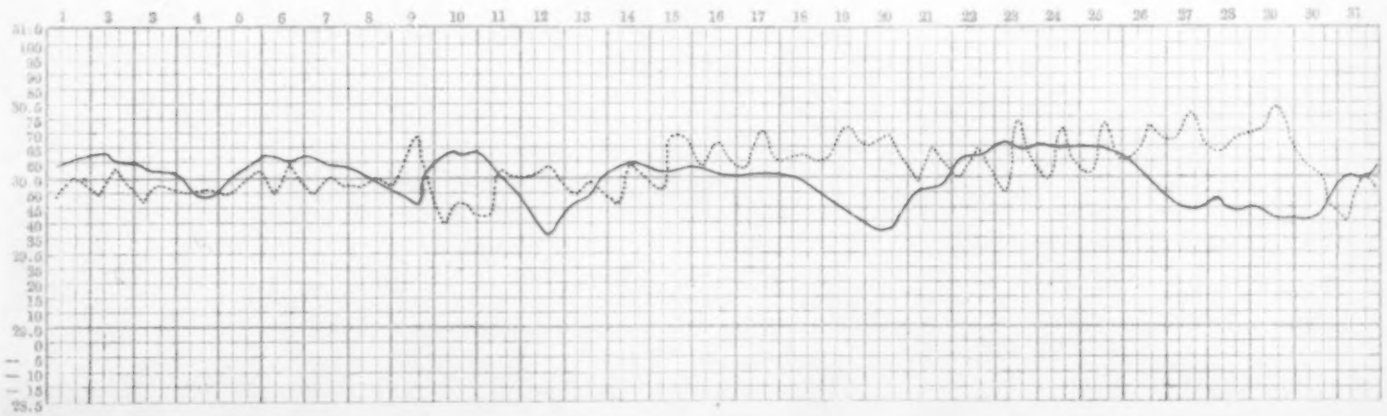
SAINT PAUL, MINN.



PORTLAND, OREG.

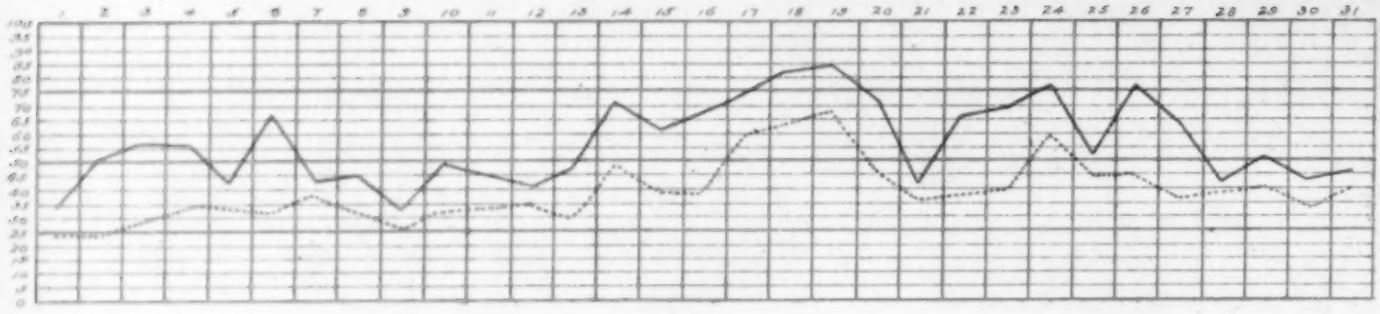


NEW ORLEANS, LA.

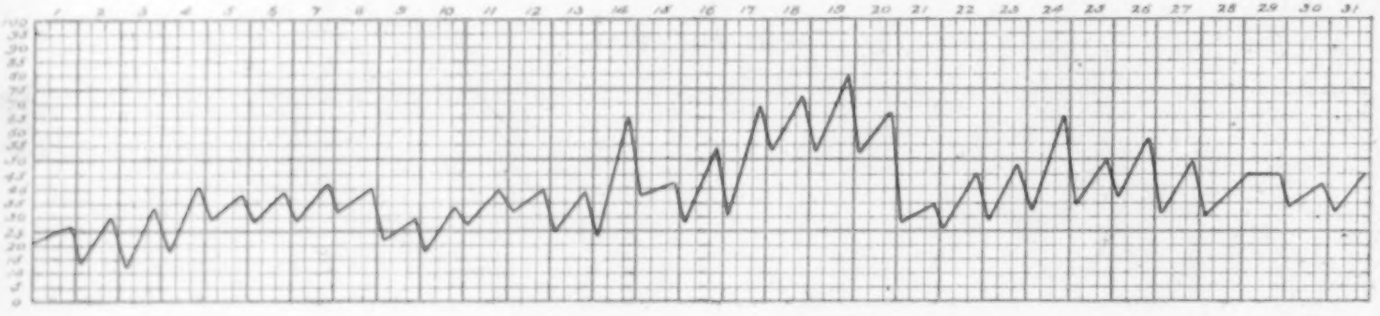


PEKIN, ILLINOIS, MARCH, 1886.

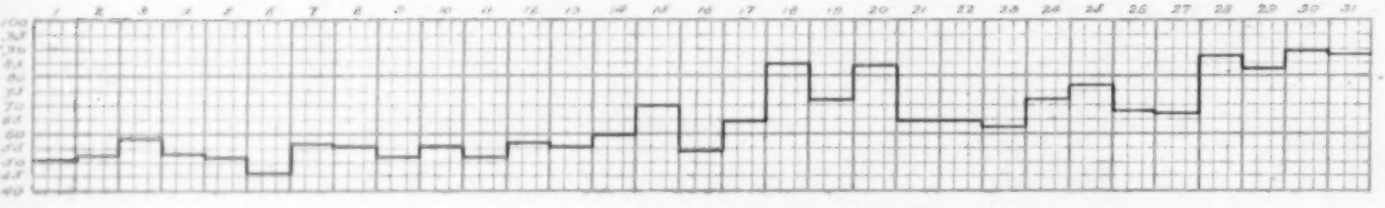
MEAN TEMPERATURE (·····) AND SUNHEAT (——).



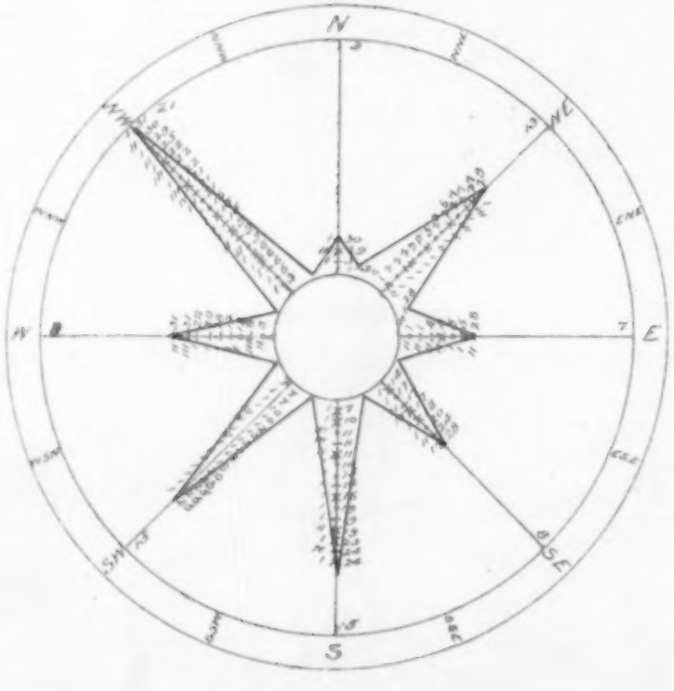
RANGE OF TEMPERATURE.



DAILY MEAN RELATIVE HUMIDITY.



DIRECTION AND FORCE OF WIND.



Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for March, 1886.

Observer and place of observation.
Adams, Effie, Logan, Iowa.
Alexander, S., Birmingham, Mich.
Anderson, Dr. W. W., Stateburg, S. C.
Altaffer, J. M., Independence, Kans.
Adams, Dr. O. H., Vineland, N. J.
Abbott, Dr. E. K., Salinas, Cal.
Arents, Hiram, Oroville, Cal.
Avey, O. H., Oskaloosa, Iowa.
Adams, A. H., Fort Meade, Fla.
Allen, J. H., Penrod, Ky.
Anderson, Prof. J. T., Fayette, Mo.
Beloit College Observatory, Beloit, Wis.
Bass, J. S., Quincy, Mass.
Blake, J. H., Blue Lake, Cal.
Bentley, David, Princeton, Cal.
Bryant, A. T., Yutan, Nebr.
Bisbee, Capt. Lewis, Buckfield, Me.
Boerner, Prof. Chas. G., Vevay, Ind.
Boynton, John F., Syracuse, N. Y.
Bayerly, J. F., Spartanburg, S. C.
Bennett, Geo., Bandon, Oreg.
Bell, Joseph, Franklin, Pa.
Brainerd, Dr. H. G., Independence, Iowa.
Baker, Dr. Henry B., Lansing, Mich.
Beall, Dr. R. L., Lenoir, N. C.
Brendel, Dr. Fred., Peoria, Ill.
Bartlett, E. B., Vermillion, N. Y.
Baldwin, A. L., Bethel, Conn.
Briggs, John, Albany, Oreg.
Betts, Prof. Arthur, Webster, Dak.
Breed, J. E., Embarras, Wis.
Boyd, Joseph, Oskaloosa, Iowa.
Beebe, A., Manistique, Mich.
Boies, Lieut. A. H., Hudson, Mich.
Beans, T. J., Moorestown, N. J.
Barney, W., Stowe, Vt.
Blachly, C. P., Manhattan, Kans.
Bridges, Q. A., Berlin Mills, N. H.
Beecher, Chas., Wysox, Pa.
Bowman, Pater, Ruggles, Ohio.
Cook, S. A., Milledgeville, Ga.
Cowgill, Prof. E. B., Manhattan, Kans.
Cutler, J. L., Quitman, Ga.
Charbonnier, Prof. L. H., Athens, Ga.
Casey, Geo., Auburn, N. Y.
Crawford, E. A., Liberty Hill, La.
Curtiss, G. G., Fallston, Md.
Cornell University, Ithaca, N. Y.
Cutting, Dr. Hiram A., Lunenburg, Vt.
Crosier, Adam, Laconia, Ind.
Caulkins, John S., Thornville, Mich.
Clark, T. A., Weldon, N. C.
Cass, John J., Allison, Kans.
Cleveland, Dr. G. H., Pentwater, Mich.
Carpenter, Dr. W. B., Leavenworth, K.
Christ, Jacob, Franklin, Wis.
Cheney, Wm., Minneapolis, Minn.
Culver, G. E., Vermillion, Dak.
Carter, Rev. Dr. W. H., Tallahassee, Fla.
Comstock, Prof. F. M., Le Roy, N. Y.
Collin, Prof. A., Mount Vernon, Iowa.
Cummings, L. D., Palmyra, N. Y.
Cooper, Dr. Geo. C., Manatee, Fla.
Chubbs, Thos. H., Post Mills, Vt.
Cole, Seward, Cahuenga, Cal.
Cutler, B. B., Heath, Mass.
Childs, W. H., Brattleborough, Vt.
Cochran, Wm. P., Wakefield, Kans.
Colton, Prof. G. H., Hiram, Ohio.
Caffee, Wm. R., Carthage, Mo.
Charlton, Prof. O. C., Ottawa, Kans.
Chandler, Dr. W. J., South Orange, N. J.
Colton, Dr. D. B., Portsmouth, Ohio.
Carrington, G. D., Brownville, Nebr.
Dazey, J. B., Charleston, Ill.
Dechant, W. H., Mahanoy Plane, Pa.
Dow, Roswell, Sycamore, Ill.
Deming, H. D., Wellsborough, Pa.
Dozier, Wm., Mattoon, Ill.
Dewhurst, Rev. E., Voluntown, Conn.
Day, Theodore, Dyberry, Pa.

Observer and place of observation.
Dawson, Wm., Spiceland, Ind.
Davis, W. O., Bloomington, Ill.
Dunton, Lieut. W. R., Dorset, Vt.
Dinsmore, jr., Prof. T. H., Emporia, Kans.
Ellason, W. A., Statesville, N. C.
Eckstein, Rev. M., Conception, Mo.
Ellis, John, Marquette, Nebr.
Everett, Dr. J. T., Clyde, Ohio.
Ewell, Dr. M. D., South Evanston, Ill.
Fox, F. E., Fall Brook, Cal.
Fox, G. W., Marietta, Cal.
Ford, H. C., El Dorado, Kans.
Ferris, B. F., Sunman, Ind.
Friend, Chas. W., Carson City, Nev.
Fleming, J., Readington, N. J.
Field, Thos. G., Parkersburg, W. Va.
Ferguson, W., Paterson, N. J.
Fernald, Prof. M. C., Orono, Me.
Frick, John H. Warrenton, Mo.
Foss, E. T., Hydesville, Cal.
Granville, J. J., East Saginaw, Mich.
Gore, Prof. J. W., Chapel Hill, N. C.
Gibson, J. H., Salina, Kans.
Geddings, Dr. W. H., Aiken, S. C.
Gates, W. B., Burlington, Vt.
Grathwohl, John, Blooming Grove, Pa.
Gillingham, Milnor, Fallsington, Pa.
Gardiner, R. H., Gardiner, Me.
Gowey, H. D., North Lewisburg, Ohio.
Green, Dr. Jesse C., West Chester, Pa.
Gerrish, S. H., Sacramento, Cal.
Gray, J. W., Stockham, Nebr.
Goodwin, Wm., North Colebrook, Conn.
Gray, F. H., Yates Centre, Kans.
Gillingham, W., Accotink, Va.
Garlick, Rev. Dr. J. R., Bruington, Va.
Gray, Capt. A. W., Kenewick, Wash. T.
Gustin, M., Troy, Pa.
Heath, E. R., Wyandotte, Kans.
Harvard College Observatory, Cambridge, Mass.
Hammitt, John W., College Hill, Ohio.
Heaton, Isaac E., Fremont, Nebr.
Hoskinson, R. M., Bainbridge Island, Wash T.
Hyde, G. A., Cleveland, Ohio.
Haywood, John, Westerville, Ohio.
Hartzler, J. A., Mottville, Mich.
Hall, J. B., Worcester, Mass.
Hager, Mrs. L. G., Terre Haute, Ind.
Howe, Prof. J. L., Richmond, Ky.
Houghton Farm Experiment Station, Mountainville, N. Y.
Heatwole, L. J., Dale Enterprise, Va.
Hazen, Rev. A. Deerfield, Mass.
Hamilton, W. H., Corsicana, Tex.
Hatch, A. H., Windsor, Ill.
Harris, W. C., Dover, N. J.
Hodge, Rev., F. B., Wilkesbarre, Pa.
Humphrey, Dr. L., Fairbury, Nebr.
Heacock, J. L., Quakertown, Pa.
Harris, T. C., Raleigh, N. C.
Hanson, Olof, Kendall Green, D. C.
Hunter, Dr. T. C., Napoleon, Ohio.
Hall, Chas. C., Dudley, Mass.
Horn, Dr. H. B., Atchison, Kans.
Johnson, F. C., Wilkesbarre, Pa.
James, John W., Marengo, Ill.
Jones, Dr. E. U., Taunton, Mass.
Jackson Company, Nashua, N. H.
Jordan, Dr. M. D. L., Milan, Tenn.
Jones, Ira B., Neillsville, Wis.
Jones, F. M., Puerto de Luna, N. Mex.
Kirkwood, E., Mauzy, Ind.
Knapp, J. G., Limona, Fla.
Keese, G. Pomeroy, Cooperstown, N. Y.
Kuhne, F. W., Fort Wayne, Ind.
King, W. R., Yellow Springs, Ohio.
Kedzie, D. H. Midland, Tex.
Kent, Miss E., Phillipsburg, N. J.

Observer and place of observation.
Keese, G. Pomeroy, Cooperstown, N. Y.
Kaufman, H. W., Quakertown, Pa.
Lovewell Prof. J. T., Topeka, Kans.
Livermore, Chas. C., Fort Gatlin, Fla.
Lueps, Miss Anna, Manitowoc, Wis.
Lincoln, A. T., Marion, Va.
Loomis, J. C., Jeffersonville, Ind.
Lay, Dr. F. H., Pueblo, Colo.
Luther, S. M., Garrettsville, Ohio.
Ladshaw, Geo. E., Pacolet, S. C.
Lamb, Miss Bertha E., Sterling, Kans.
Loud, Prof. F. H., Colorado Springs, Colo.
Laughlin, D. L., Knightstown, Ind.
Lerch & Rice, Bethlehem, Pa.
Lamar, T. J., Prattville, Ala.
Memminger, E. R., Flat Rock, N. C.
Morgan, L. Ray, Philipsburg, Pa.
Miller, H. D., Drifton, Pa.
Mount Saint Mary's College, Emmittsburg, Md.
McNeill, M., Princeton, N. J.
McClintock, Frank, West Union, Iowa.
Matzinger, Rev. P. F., Preston, Minn.
Munn, A. M., Kalamazoo, Mich.
McPherson, Wm., Rose Valley, Cal.
McDonogh Institute, McDonogh, Md.
McCready, Miss L. A., Fort Madison, Iowa.
Moore, C. R., Bird's Nest, Va.
Micklen, J. H., Variety Mills, Va.
McKenzie, Dr. M., Centreville, Mo.
Macrae, Colin, Kirkwood, S. C.
Meehan, Thos., Germantown, Pa.
Moore, Nathan, Grampian Hills, Pa.
Mikesell, Thos., Wauseon, Ohio.
Marshall, G., Cresco, Iowa.
Mitchell, Dr. D. W., Harrisville, Mich.
Moore, Dr. J. W., Easton, Pa.
Motte, L. S., West Milton, Ohio.
Marshall, Gregory, Cresco, Iowa.
Nordberg, A., Richardton, Dak.
Newbegin, John D., Anna, Ill.
Newcomb, G. S., Westborough, Mass.
Norcom, Prof. T. J., Reidsville, N. C.
Neal, Dr. J. C., Archer Fla.
Norbury, F. P. Beardstown, Ill.
Olds, H. D., Cedar Rapids, Iowa.
Owsley, Dr. J. B., Jacksonborough, O.
Pearce, Thomas, Eola, Oreg.
Pritchett, Prof. H. C., Huntsville, Tex.
Partrick, J. M., North Volney, N. Y.
Purdue University, Lafayette, Ind.
Pettersón, Dr. F., Comfort, Tex.
Pendleton, A., Nicolaus, Cal.
Parrish, G. W., Ellensburg, Wash. T.
Postma, H. Y., Egg Harbor City, N. J.
Parker, D., Humboldt, Iowa.
Roberts, Luke, Clinton, Iowa.
Roeder, W. F., Zionsville, Pa.
Rotch, A. L., Blue Hill Obs'y, Mass.
Randall, E. H., Poultney, Vt.
Renfew, H. N., Bancroft, Iowa.
Remington, C. V. S., Fall River, Mass.
Robertson, T. D., Rockford, Ill.
Rogers, F. M., Luling, La.
Rerick, R. H., La Grange, Ind.
Rodman, T. R., New Bedford, Mass.
Runge, C., New Ulm, Tex.
Richardson, C. F., Beverly, N. J.
Starr, Prof. F. Cedar Rapids, Iowa.
Shaw, E. Minnesota, Kans.
Strong, W. C., Kent's Hill Me.
Sanders, T. B. Susanville, Cal.
Simmons, Prof. W. G., Wake Forest, N. C.
Shriver, E. T., Cumberland, Md.
Seltz, Chas., De Soto, Nebr.
Scott, Thos. G., Forsyth, Ga.
Stucky, Dr. C. T., Helvetia, W. Va.
Slade, Ella a, Somerset, Mass.
Shriver, Howard, Wytheville, Va.
Sonedecker, Rev. T. H., Fostoria, Ohio.

Observer and place of observation.
Slenker, Mrs. E. D., Snowville, Va.
Smyth, B. B., Topeka, Kans.
Sim, J. R., Summit, Va.
Scribner, H. F. J., Strafford, Vt.
Strong, S. B., Stanket, N. Y.
Somerville, W. B., Birmingham, Ala.
Samostz, Oscar, Austin, Tex.
Shepard, E. M., Springfield, Mo.
Safford, A. T., Williamstown, Mass.
Sherman, W. B., Manchester, Iowa.
Standenmayer, Dr. L. R., Lincolnton, N. C
Spilman, J. J., Pierce City, Mo.
Swezey, Prof. G. D., Crete, Nebr.
Sacred Heart College, Prairie du Chien, Wis.
Stills, T. J., Paris, Tenn.
Snell, S. C., Amherst, Mass.
Snow, Prof. F. H., Lawrence, Kans.
Smith, H. D., Monticello, Iowa.
Tilman, C. M., Mount Blanco, Tex.
Trembley, Dr. J. B., Oakland, Cal.
Todd, Prof. David P., Amherst, Mass.
Thornton, Prof. N., Geneseo, Ill.
Teele, Rev. A. K., Blue Hill, Mass.
Truman, Geo. S., Genoa, Nebr.
Terborg, J. E., Pekin, Ill.
Turnbo, Silas C., Pro Tem, Mo.
Tillinghast, C. B., Albany, N. Y.
Thompson, A. G., Mead, Nebr.
Underhill, Dr. C. B., Salida, Colo.
Voegeli, Adolphus, Des Moines, Iowa.
Vermillion, W. W., Frankford, Mo.
Went, E. C., Frankfort, Ky.
Washburn Observatory, Madison, Wis.
Wild, Rev. E. P., Newport, Vt.
Williams, Rev. C. F., Ashwood, Tenn.
Wing, Miss M. E., Charlotte, Vt.
West, Silas, Cornish, Me.
Wylie, Wm., Mount Forest, Canada.
Walton, J. P., Muscatine, Iowa.
Wait, S. E., Traverse City, Mich.
Woodstock College, Woodstock, Md.
Wolfe, John H., Wellington, Kans.
West, Dr. Jos. O., Princeton, Mass.
Washington Aqueduct. — Receiving Reservoir, D. C; Distributing "; Great Falls Reservoir, Md; Rock Creek Bridge, D. C.
Winipiseogee Lake Cotton and Woolen Manufacturing Co. — Weir's Bridge, N. H.; Woodstock, N. H.; Wolfborough, N. H.; Lake Village, N. H.; Bristol, N. H.; Belmont, N. H.; Ashland, N. H.
Willis, O. R., A. M., Ph. D., White Plains, N. Y.
Watters, Dr. Jas., Westmoreland, Kans.
Williams, Dr. A. C., Elk Falls, Kans.
Wigg, Dr. Geo., East Portland, Oreg.
Wright, J. W. A., Greensborough, Ala.
Whitmore, J. E., Gallinas Spring, N. Mex.
Wadsworth, Dr. J. L. R., Collinsville, Ill.
Widman, Rev. C. M., Grand Coteau, La.
Williams, Dr. A. C., Elk Falls, Kans.
Watson, Evan, Fort Scott, Kans.
White, Rev. J. H., Merritt's Island, Fla.
Ward, J. B., Guilford, Ind.
Whitney, Chas. E., Humphrey, N. Y.
Wilson, W. T., Clayton, N. J.
Wood, Joseph, Bar Harbor, Me.
Woody, Rev. C. A., Pendleton, Oreg.
Wearmouth, J., University of Virginia, Va.
Waterman, Wm., Hay Springs, Nebr.
Wedge, J. C., Fond du Lac, Wis.
Yetter, Wm. G., Catawissa, Pa.
Yates, T. P., Factoryville, N. Y.
Young, Geo. R., Penn Yan, N. Y.
Zimmerman, F. C., Bunker Hill, Ill.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for March, 1886.

Alcatraz Island, Cal.	Clark, Fort, Tex.	Lowell, Fort, Ariz.	McHenry, Fort, Md.	Riley, Fort, Kans.	Supply, Fort, Ind. T.
Angel Island, Cal.	Columbus, Fort, N. Y. H.	Laramie, Fort, Wyo.	Mount Vernon B'ks, Ala.	Ringgold, Fort, Tex.	Totten, Fort, Dak.
Assinaboine, Fort, Mont.	David's Island, N. Y. H.	Lyon, Fort, Colo.	Niagara, Fort, N. Y.	Snelling, Fort, Minn.	Townsend, Ft., Wash. T.
A. Lincoln, Fort, Dak.	Ellis, Fort, Mont.	McIntosh, Fort, Tex.	Niobrara, Fort, Nebr.	Saint Augustine, Fort, Fla.	Union, Fort, N. Mex.
Benicia Barracks, Cal.	Fred Steele, Fort, Wyo.	Missoula, Fort, Mont.	Presidio of San Francisco, Cal.	Sully, Fort, Dak.	Verde, Fort, Ariz.
Bidwell, Fort, Cal.	Gaston, Fort, Cal.	Mason, Fort, Cal.	Plattsburg Barracks, N. Y.	Sisseton, Fort, Dak.	Washakie, Fort, Wyo.
Brady, Fort, Mich.	Halleck, Fort, Nev.	Madison Barracks, N. Y.	Pembina, Fort, Dak.	Shaw, Fort, Mont.	Wingate, Fort, N. Mex.
Bridger, Fort, Wyo.	Hays, Fort, Kans.	McDermit, Fort, Nev.	Randall, Fort, Dak.	Spokane, Fort, Wash. T.	West Point, N. Y.
Bayard, Fort, N. Mex.	Huachuca, Fort, Ariz.	Monroe, Fort, Va.	Robinson, Fort, Nebr.	Selden, Fort, Nebr.	Walla Walla, Ft., Wash. T.
Boise, Fort, Idaho.	Klamath, Fort, Oreg.	McDowell, Fort, Ariz.	Reno, Fort, Ind. T.	Sidney, Fort, Nebr.	Yates, Fort, Dak.
Cœur d'Alene, Ft., Idaho.	Keogh, Fort, Mont.				

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for March, 1886.

Alabama State Weather Service, under direction of Prof. P. H. Mell, jr., Auburn, Alabama.
Illinois Weather Service, under direction of Mr. Charles F. Mills, Springfield, Illinois.
Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
Indiana State Weather Service, under direction of Prof. W. H. Ragan, De Pauw University, Greencastle, Indiana.
Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Missouri.
Nebraska Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
New England Meteorological Society, Prof. Winslow Upton of Providence, R. I., President; Prof. W. M. Davis, of Cambridge, Mass., Secretary.
Ohio State Weather Service, under direction of Prof. B. F. Thomas, of the Ohio State University, Columbus, Ohio.
Tennessee State Weather Service, under direction of Major H. C. Bate, Nashville, Tennessee.

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